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Natural History of Victoria.

PRODROMUS

OF THE

ZOOLOGY OF VICTORIA;

OR,

FIGURES AND DESCRIPTIONS OF THE LIVING SPECIES OF ALL CLASSES

OF THE

VICTORIAN INDIGENOUS ANIMALS.

VOLUME I.

(DECADES I. TO X.)

BY

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PREFACE TO VOL. I.

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It having been considered desirable to ascertain accurately the natural productions of the Colony of Victoria, and to publish works descriptive of them, on the plan of those issued by the Governments of the different States of America, investigations were undertaken, by order of the Victorian Government, to determine the Geology, Botany, and Zoology of the Colony, to form collections illustrative of each for the public use, and to make the necessary preparations for such systematic publications on the subject as might be useful and interesting to the general public, and contribute to the advancement of science.

As the geological and botanical investigations have already approached completion, and their publication is far advanced, it has been decided now to commence the publication of the third branch completing the subject, namely, that of the Zoology or indigenous members of the different classes of the animal kingdom.

As the Fauna is not so well known as the Flora, it was a necessary preliminary to the publication to have a large number of drawings made, as opportunity arose, from the living or fresh examples of many species of reptiles, fish, and the lower animals, which lose their natural appearance shortly after death, and the true characters of many of which were consequently as yet unknown, as they had

only been described from preserved specimens. A Prodromus, or preliminary issue, in the form of Decades, or numbers of ten plates, each with its complete descriptive letterpress, will be published, of such illustrations as are ready, without systematic order or waiting for the completion of any one branch. The many good observers in the country will thus have the means of accurately identifying various natural objects, their observations on which, if recorded and sent to the National Museum, where the originals of all the figures and descriptions are preserved, will be duly acknowledged, and will materially help in the preparation of the final systematic volume to be published for each class when it approaches completion.

The tenth Decade completes the first volume of the Prodromus of the Zoology of Victoria. A systematic index is given according to which the plates with their corresponding letterpress may be bound in zoological order, all the illustrations of each class being put together by those who desire it. Those who prefer to bind the plates and corresponding letterpress in the order of their original appearance, and as the plates are consecutively numbered, can do so, bringing the prefaces together at the front. An alphabetical index is also given of the contents; the generic, specific, and popular names being included, as well as the synonyms, which are in italics.

FREDERICK McCOY.

12th January, 1885.

SYSTEMATIC INDEX TO VOL. I.

SUB-KINGDOM I.—VERTEBRATA.

CLASS I.—MAMMALIA.

ORDER—FERÆ.

(*Section—Pinnipedia.*)

FAMILY—PHOCIDÆ.

(*Sub-family—Otarinæ.*)

Plates

Euotaria 31, 71
Stenorhynchus 21

ORDER—CETACEA.

FAMILY—DELPHINIDÆ.

Delphinus 22

ORDER—MARSUPIALIA.

FAMILY—PHALANGISTIDÆ.

Gymnobelideus 91

CLASS III.—REPTILIA.

(*Section—Squamata.*)

ORDER—SAURIA.

(*Sub-order—Leptoglossæ.*)

(*Tribe—Cyclosaurœ.*)

FAMILY—MONITORIDÆ.

Hydrosaurus 41

(*Tribe—Geissosaura.*)

FAMILY—SCINCIDÆ.

Rhodona 51
Cyclodus 72, 94

(*Sub-order—Pachyglossæ.*)

(*Tribe—Strobilosaura.*)

FAMILY—AGAMIDÆ.

Plates

Physignathus 81

ORDER—OPHIDIA.

FAMILY—PYTHONIDÆ.

Morelia 13

FAMILY—ELAPSIDÆ.

Diemenia 23
Pseudechys 1
Furina 32
Hoplocephalus 2, 3, 11
Vermicella 52

FAMILY—VIPERIDÆ. (?)

Acanthophis 12

(*Section—Cataphracta.*)

ORDER—CHELONIA.

(*Sub-order—Pleuroderes.*)

FAMILY—CHELYDIDÆ.

(*Sub-family—Hydraspidinæ.*)

Chelodina 92, 93
Chelymys 82, 83

ORDER—BATRACHIA.

(*Sub-order—Anoura.*)

(*Section—Opisthoglossa.*)

FAMILY—HYLIDÆ.

Ranoidea 53

FAMILY—CYSTIGNATHIDÆ.

Limnodynastes 42

CLASS IV.—PISCES.

(*Sub-class—Palæichthyes.*)

ORDER—PLAGIOSTOMATA.

(*Sub-order—Selachoidea.*)

FAMILY—CARCHARIIDÆ.

	Plates
Galeus	64
Zygæna	56
Mustelus...	87

FAMILY—LAMNIIDÆ.

Carcharodon	74
Odontaspis	64
Alopecias	88

FAMILY—NOTIDANIDÆ.

Notidanus	43

FAMILY—SCYLLIDÆ.

Crossorhinus	43

FAMILY—SPINACIDÆ.

Acanthias	75

FAMILY—RHINIDÆ.

Rhina	34

FAMILY—PRISTIOPHORIDÆ.

Pristiophorus	56

(*Sub-order—Batoidei.*)

FAMILY—MYLIOBATIDÆ.

Myliobatis	63

(*Sub-class—Teleostea.*)

ORDER—ACANTHOPTERYGIA.

FAMILY—PERCIDÆ.

Lates	14
Arripis	16, 17
Oligorus	85, 86
Ctenolates	84

FAMILY—SPARIDÆ.

	Plates
Girella	73
Chrysophrys	4

FAMILY—SCORPÆNIDÆ.

Sebastes	33

FAMILY—TRICHIURIDÆ.

Thersites	44

FAMILY—CARANGIDÆ.

Trachurus	18

FAMILY—SCOMBERIDÆ.

Scomber	28
Thynnus...	44

FAMILY—TRIGLIDÆ.

Trigla	6
Lepidotrigla	5

ORDER—ANACANTHINI.

FAMILY—GADOPSIDÆ.

Gadopsis...	27

FAMILY—GADIDÆ.

Lotella	19
Pseudophysis	20

FAMILY—OPHIDIIDÆ.

Genypterus	27

ORDER—PHYSOSTOMI.

FAMILY—SCOPELIDÆ.

Aulopus	54, 55

ORDER—LOPHOBRANCHII.

FAMILY—SYNGNATHIDÆ.

Phyllopteryx	65
Hippocampus	65

SUB-KINGDOM II.—MOLLUSCA.

CLASS—CEPHALOPODA.

(*Sub-class—Antipedia.*)

ORDER—ACETABULIFERA.

(*Sub-order—Octopoda.*)

FAMILY—ARGONAUTIDÆ.

	Plates
Argonauta	61, 62

(*Sub-order—Decapoda.*)

FAMILY—LOLIGIDÆ.

Sepioteuthis	76, 77

(*Section—Molluscoidea.*)

CLASS—POLYZOA.

ORDER—INFUNDIBULATA.

(*Sub-order—Cheilostomata.*)

FAMILY—CATENICELLIDÆ.

Catenicella	24, 89, 90

FAMILY—CELLULARIIDÆ.

Cellularia	49, 58
Emma	58
Menipea	58

FAMILY—SALICORNARIIDÆ.

Cellaria	49
Nellia	49
Tubucellaria	49

FAMILY—BICELLARIIDÆ.

	Plates
Bicellaria	59
Bugula	59, 78
Stirparia	59

FAMILY—FLUSTRIDÆ.

Flustra	45
Carbasea	45
Diachoris	46
Spiralaria	46

FAMILY—GEMELLARIIDÆ.

Didymia	46
Dimetopia	46
Calwellia	46

FAMILY—MEMBRANIPORIDÆ.

Membranipora	25, 26, 36
Lepralia	...35, 36, 37, 38
Biflustra	57

FAMILY—STEGANOPORELLIDÆ.

Steganoporella	60

FAMILY—ESCHARIDÆ.

Eschara	48
Caleschara	48
Retepora ...	94, 95, 96, 97, 98, 99
Dictyopora	47, 66, 67
Petralia	60

(*Sub-order—Cyclostomata.*)

FAMILY—CRISIIDÆ.

Crisia	39

FAMILY—IDMONEIDÆ.

Idmonea	68

SUB-KINGD. III.—ARTICULATA.

CLASS—CRUSTACEA.

ORDER—DECAPODA.

(*Section—Macroura.*)

FAMILY—ASTACIDÆ.

	Plates
Astacopsis	15, 29
Astacoides	15, 29

CLASS—INSECTA.

ORDER—ORTHOPTERA.

(*Section—Ambulatoria.*)

FAMILY—PHASMIDÆ.

Tropidoderus	69, 70
Acrophylla	79
Podacanthus	80

ORDER—LEPIDOPTERA.

(*Section—Rhopalocera.*)

FAMILY—PAPILLIONIDÆ.

(*Sub-family—Pieridæ.*)

Pieris (Thyca)	9, 10

(*Section—Heterocera.*)

FAMILY—URANIIDÆ.

Agarista	8

FAMILY—HEPIALIDÆ.

Zeuzera (Eudoxyla)	30

FAMILY—PSYCHIDÆ.

	Plates
Entometa	40
Metura	40

ORDER—HEMIPTERA.

(*Tribe—Homoptera.*)

(*Section—Trimera.*)

FAMILY—CICADIDÆ.

Cicada	50
Cyclochila	50

CLASS—ANNELIDA.

ORDER—ABRANCHIATA.

(*Section—Terricola.*)

FAMILY—LUMBRICIDÆ.

Megascolides	7

SUB-KINGDOM IV.—RADIATA.

CLASS—ECHINODERMATA.

ORDER—ECHINOIDEA.

(*Sub-order—Desmosticha.*)

FAMILY—CIDARIDÆ.

Goniocidaris	100

CONTENTS OF DECADES.

N.B.—The originals of all the Figures are in the National Museum, Melbourne.

DECADE I.

PLATE 1.—The Black Snake (Pseudechys porphyriacus, Shaw sp.).
PLATE 2.—The Copper-head Snake (Hoplocephalus superbus, Günth.).
PLATE 3.—The Tiger Snake (Hoplocephalus curtus, Schl. sp.).
PLATE 4.—The Australian Bream (Chrysophrys Australis, Günth.).
PLATE 5.—The Spiny-sided Butterfly-Gurnard (Lepidotrigla Vanessa, Rich. sp.).
PLATE 6.—The Kumu Gurnard (Trigla Kumu, Lesson and Garn.).
PLATE 7.—The Australian Giant Earth-worm (Megascolides Australis, McCoy).
PLATE 8.—Lewin's Day-moth (Agarista Lewini, Boisd.).
The Loranthus Day-moth (Agarista Casuarinæ, Scott).
The Vine Day-moth (Agarista Glycine, Lewin sp.).
PLATE 9.—Pieris (Thyca) Harpalyce (Don. sp.).
PLATE 10.—Pieris (Thyca) Aganippe (Don. sp.).

DECADE II.

PLATE 11.—The Little Whip Snake (Hoplocephalus flagellum, McCoy). The White-lipped Snake (Hoplocephalus coronoides, Günth.).
PLATE 12.—The Death Adder (Acanthophis Antarctica, Shaw sp.).
PLATE 13.—The Carpet Snake (Morelia variegata, Gray).
PLATE 14.—The Gippsland Perch (Lates colonorum, Günth.).
PLATE 15.—The Murray Lobster (Astacoides serratus, Shaw sp.).
PLATE 16.—The Salmon Arripis (Arripis truttaceus, Cuv. sp.). Adult.
PLATE 17.—Ditto of the younger forms and coloring.
PLATE 18.—The Horse Mackerel (Trachurus trachurus, Lin. sp.).
PLATE 19.—The Small-scaled Rock Cod (Lotella callarias, Günth.).
PLATE 20.—The Australian Rock Cod (Pseudophysis barbatus, Günth.).

DECADE III.

PLATE 21.—The Sea-Leopard Seal (Stenorhynchus leptonyx, de Blainv. sp.).
PLATE 22.—The Yellow-sided Dolphin (Delphinus Novæ Zealandiæ, Quoy and Gaim.).
PLATE 23.—The Common Brown Snake (Diemenia superciliosa, Fisch.).
The Small-scaled Brown Snake (Diemenia microlepidota, McCoy).
The Shield-fronted Brown Snake (Diemenia aspidorhyncha, McCoy).
PLATE 24.—Catenicella margaritacea (Busk).—C. plagiostoma (Busk).—C. ventricosa (Busk).—C. hastata (Busk.)—C. rufa (McG.).—C. cribraria (Busk).—C. alata (Wyv. Thomson).—C. lorica (Busk).—C. formosa (Busk).—C. elegans (Busk).—C. perforata (Busk).—C. Buskii (Wyv. Thomson).—C. Hannafordi (McG.).—C. crystallina (Wyv. Thomson).—C. carinata (Busk).—C. aurita (Busk).—C. geminata (Wyv. Thomson).—C. cornuta (Busk).—C. intermedia (McG.)
PLATE 25.—Membranipora membranacea (Linn. sp.).—M. perforata (McG.).—M. ciliata (McG.).—M. mamillaris (McG.).—M. umbonata (Busk).—M. pilosa (Linn. sp.).—M. cervicornis (Busk).
PLATE 26.—Membranipora dispar (McG.).—M. Woodsii (McG.).—M. lineata (Linn. sp.).—M. Rosselii (Audouin sp.).—M. Lacroixii (Savigny sp.).
PLATE 27.—The Australian Rockling (Genypterus Australis, Cast.).
The Yarra Blackfish (Gadopsis gracilis, McCoy).
PLATE 28.—The Southern Mackerel (Scomber pneumatophorus, De la Roche).
PLATE 29.—The Yabber Crayfish (Astacoides bicarinatus, Gray sp.).
PLATE 30.—The Large Wattle Goat-Moth (Zeuzera Eucalypti, Boisd. Herr.-Schæf.).

DECADE IV.

PLATE 31.—The Australian Sea-Bear or Fur-Seal (Euotaria cinerea, Péron sp.).
PLATE 32.—The Two-hooded Furina-Snake, Furina bicucullata (McCoy).
PLATE 33.—The Banded Red Gurnet-Perch (Sebastes percoides, Solander sp.).
PLATE 34.—The Angel-fish (Rhina squatina, Lin. sp.).
PLATE 35.—Lepralia circinata (McG.).—L. Cecilii (Aud.).—L. diaphana (McG.).—L. marsupium (McG.).—L. subimmersa (McG.).—L. anceps (McG.).—L. Maplestonei (McG.).
PLATE 36.—Lepralia vittata (McG.).—Membranipora perforata. Lepralia Brogniartii (Aud.).—L. elegans (McG.).—L. pertusa (Esper. sp.).—L. Malusii (Aud. sp.).—L. lunata (McG.).
PLATE 37.—Lepralia ciliata (Linn. sp.).—L. trifolium (McG.).—L. cheilodon (McG.).—L. canaliculata (McG.).—L. larvalis (McG.).—L. diadema (McG.).—L. papillifera (McG.).—L. Ellerii (McG.).
PLATE 38.—Lepralia monoceros (Busk).—L. excavata (McG.).—L. vitrea (McG.).—L. megasoma (McG.).—L. Schizostoma (McG.).—L. Botryoides (McG.).—L. ferox (McG.).—L. pellucida (McG.).
PLATE 39.—Crisia Edwardsiana (D'Orb. sp.).—C. biciliata (McG.).—C. acropora (Busk).—C. setosa (McG.).—C. tenuis (McG.).
PLATE 40.—Saunders' Case-Moth (Metura elongata, Saunders sp.).
The Lictor Case-Moth (Entometa ignobilis, Walk.).

DECADE V.

PLATE 41.—The Lace Lizard (Hydrosaurus varius, Shaw sp.).
PLATE 42.—The Spotted Marsh-Frog (Limnodynastes Tasmaniensis, Günth.).—The Common Sand-Frog (Limnodynastes dorsalis, Gray).
PLATE 43.—The Carpet Shark (Crossorhinus barbatus, Lin. sp.).—The Seven-gilled Shark (Notidanus [Heptanchus] Indicus, Cuv.).
PLATE 44.—The Barracouta (Thersites atun, Cuv.).—The Tunny (Thynnus Thynnus, Lin. sp.).
PLATE 45.—Flustra denticulata (Busk).—Carbasea episcopalis (Busk).—C. dissimilis (Busk).—C. indivisa (Busk).—C. elegans (Busk).—C. pisciformis (Busk).
PLATE 46.—Spiralaria florea (Busk).—Diachoris Magellanica (Busk).—D. spinigera (P. McGil.).—Dimetopia spicata (Busk).—D. cornuta (Busk).—Didymia simplex (Busk).—Calwellia bicornis (Wyv. Thomson).
PLATE 47.—Dictyopora cellulosa (P. McGil.).
PLATE 48.—Eschara obliqua (P. McGil.).—E. dispar (P. McGil).—E. gracilis (Lamx.).—E. platalea (Busk).—E. quadrata (P. McGil.)—E. mucronata (P. McGil.).—Caleschara denticulata (P. McGil.).
PLATE 49.—Cellaria fistulosa (Linn.).—C. hirsuta (P. McGil.).—C. tenuirostris (Busk.).—C. gracilis (Busk).—Nellia oculata (Busk).—Tubucellaria hirsuta (Busk).
PLATE 50.—The Great Black, or Manna Cicada (Cicada mœrens, Germ.).—The Great Green Cicada (Cyclochila Australasiæ, Donov. sp.).

DECADE VI.

PLATE 51.—The Victorian Rhodona (Rhodona Officeri, McCoy).
PLATE 52.—The Black and White Ringed Snake (Vermicella annulata, Gray).
PLATE 53.—The Green and Golden Bell-Frog (Ranoidea aurea, Less. sp.).
PLATES 54–55.—The Australian Aulopus (Aulopus purpurisatus, Rich.).
PLATE 56.—The Hammer-headed Shark (Zygæna malleus, Shaw).—The Common Australian Saw-Fish (Pristiophorus nudipinnis, Günth.).
PLATE 57.—Biflustra perfragilis (McGil.).—B. delicatula (Busk).
PLATE 58.—Cellularia cuspidata (Busk).—Menipea crystallina (Gray sp.).—M. cyathus (Wyv. Thomson).—M. cervicornis (McGil.)—M. tricellata (Busk).—M. Buskii (Wyv. Thomson).
PLATE 59.—Bicellaria tuba (Busk).—B. grandis (Busk).—B. ciliata (Linn).—B. turbinata (McGil.).—Stirparia annulata (Map.).—Bugula neritina (Linn.).
PLATE 60.—Steganoporella magnilabris (Busk. sp.).—Petralia undata (McGil.).

DECADE VII.

PLATE 61.—The Tuberculated Argonaut (Argonauta oryzata, Meusch.).
PLATE 62.—The same seated in its so-called shell or Paper-Nautilus.
PLATE 63.—The Blue-spotted Eagle-Ray (Myliobatis Australis, Macleay).
PLATE 64.—The Long-toothed Bull-Shark (Odontaspis taurus, Raf.).—The Australian Tope Shark (Galeus Australis, Macleay).
PLATE 65.—The Leafy Sea-Dragon (Phyllopteryx foliatus, Shaw sp.).—The Short-headed Sea-horse (Hippocampus breviceps, Pet.)
PLATE 66.—Dictyopora grisea (Lamx. sp.).—D. albida (Kirch.)—(Var. avicularis, P. McGill.).
PLATE 67.—D. Wilsoni (P. McGill.).
PLATE 68.—Idmonea Milneana (d'Orb.).—I. contorta (P. McGill.).—I. radians (Lamk.).
PLATES 69–70.—The Violet-shouldered Phasma (Tropidoderus iodomus, McCoy).—The Red-shouldered Phasma (Tropidoderus rhodomus, McCoy).

DECADE VIII.

PLATE 71.—The Australian Sea-Bear or Fur-Seal (Euotaria cinerea, Péron sp.).
PLATE 72.—The Northern Blue-tongued Lizard (Cyclodus gigas, Bodd. sp.).
PLATE 73.—The Ludrick (Girella simplex, Rich. sp.).
PLATE 74.—The White Shark (Carcharodon Rondeletii, Müll. and Hen.).
PLATE 75.—The Picked Dog-Fish (Acanthias vulgaris, Linn. sp.).
PLATES 76–77.—The Australian Tooth-cupped Cuttlefish (Sepioteuthis Australis, Quoy and Gaim.).
PLATE 78.—Bugula robusta (P. McGil.).—B. cucullata (Busk).—B. dentata (Lamx.).—B. avicularia (Pall.).
PLATE 79.—The Violet-winged Phasma (Acrophylla violascens, Leach sp.).
PLATE 80.—The Large Pink-winged Phasma (Podacanthus typhon, Gray).

DECADE IX.

PLATE 81.—The Gippsland Water Lizard (Physignathus Lesueri, Gray)—(Var. Howitti, McCoy).
PLATES 82–83.—The Murray Tortoise (Chelymys Macquaria, Cuv. sp.).
PLATE 84.—The Murray Golden Perch (Ctenolates ambiguus, Rich. sp.).
PLATES 85–86.—The Murray Cod-Perch (Oligorus Macquariensis, Cuv. and Val. sp.).
PLATE 87.—The Australian Smooth-Hound (Mustelus Antarcticus, Günth.).
PLATE 88.—The Thresher, or Long-tailed Shark (Alopecias vulpes, Linn. sp.).
PLATE 89.—Catenicella intermedia (P. McG.).—C. amphora (Busk).—C. Wilsoni (P. McG.).—C. pulchella (Map.).—C. utriculus (P. McG.).
PLATE 90.—Catenicella fusca (P. McG.).—C. umbonata (Busk).—C. cornuta (Busk).

DECADE X.

PLATE 91.—Gymnobelideus Leadbeateri (McCoy).
PLATES 92–93.—The Long-necked River Tortoise (Chelodina longicollis, Shaw sp.).
PLATE 94.—Opercula of Retepora.
PLATE 95.—Retepora porcellana (P. McGil.).—R. avicularis (P. McGil.).—R. fissa (P. McGil.).
PLATE 96.—Retepora monilifera (P. McGil.).
PLATE 97.—Retepora monilifera (P. McGil.).—R. formosa (P. McGil.).—R. carinata (P. McGil.).
PLATE 98.—Retepora Phœnicea (Busk).—R. aurantiaca (P. McGil.).
PLATE 99.—Retepora granulata (P. McGil.).—R. tessellata (Hincks).—R. serrata (P. McGil.).
PLATE 100.—Goniocidaris tubaria (Lam.).

ALPHABETICAL INDEX TO VOL. I.

(The Synonyms are printed in *Italics*. The numerals refer to the plates.)

A.

Acanthias squalus, 75.
Acanthias vulgaris, 75.
Acanthophis Antarctica, 12.
Acanthophis Browni, 12.
,, *cerastinus*, 12.
acanthophis, *Vipera*, 12.
Acrophylla violascens, 79.
acropora, Crisia, 39.
acutirostris (var.), Retepora monilifera, form munita, 94, 96.
Adder, Deaf, 12.
Adder, Death, 12.
Adeona grisea, 66.
Aganippe, Pieris (Thyca), 10.
Agarista, Casuarinæ, 8.
,, Glycine, 8.
,, Lewini, 8.
alata, Catenicella, 24.
albida (avicularis), Dictyopora, 66.
Alopecias vulpes, 88.
altevelis, *Thersites*, 44.
ambigua, *Datnia (?)*, 84.
ambiguus, Ctenolates, 84.
Amphibolurus heterurus, 81.
amphora, Catenicella, 89.
anceps, Lepralia, 35.
Angel Fish, 34.
annulata, *Bicellaria*, 59.
annulata, Stirparia, 59.
,, Vermicella, 52.
Antarctica, Acanthophis, 12.
Antarctica, *Boa*, 12.
Antarcticus, Mustelus, 87.
appendiculatus, *Squalus*, 43.
Argonauta nodosa, 61, 62.
Argonauta oryzata, 61, 62.
Argonauta tuberculata, 61, 62.
,, *tuberculosa*, 61, 62.
Argonaut, or Paper Nautilus, Tuberculated, 61, 62.
armatus, *Astacus*, 15.
Arripis, Salmon, 16, 17.
,, truttaceus, 16, 17.
aspidorhyncha, Diemenia, 23.
Astacoides bicarinatus, 29.
,, serratus, 15.
Astacoides spinifer, 15.
Astacopsis bicarinatus, 29.
,, serratus, 15.
Astacus armatus, 15.
,, *bicarinatus*, 29.
atun, Thersites, 44.
Aulopus, Australian, 54, 55.
Aulopus Milesi, 54, 55.
Aulopus purpurisatus, 54, 55.
aurantiaca, Retepora, 94, 98.
auratus, *Dules*, 84.
aurea, *Rana*, 53.
aurea, Ranoidea, 53.
aurita, Catenicella, 24.
Australasiæ, Cyclochila, 50.
Australasiæ, *Tettigonia*, 50.
Australian Aulopus, 54, 55.
,, Bream, 4.
,, Giant Earth-Worm, 7.
,, Rock Cod, 20.
,, Rockling, 27.
,, Saw-Fish, Common, 56.
,, Sea-Bear or Fur-Seal, 31, 71.
,, Smooth-Hound, 87.
,, Tooth-cupped Cuttlefish, 76, 77.
,, Tope Shark, 64.
Australis, Chrysophrys, 4.
,, Galeus, 64.
,, Genypterus, 27.
Australis, *Hydraspis*, 82, 83.
Australis, Idmonea, 68.
,, Megascolides, 7.
,, Myliobatis, 63.
,, Sepioteuthis, 76, 77.
avicularia, Bugula, 78.
(avicularis), Dictyopora albida, 66.
avicularis, Retepora, 94, 95.

B.

Banded Red Gurnet-Perch, 33.
barbatus, Crossorhinus, 43.
,, Pseudophysis, 20.
barbatus, *Squalus*, 43.
Barracouta, 44.
Bear, Fur-Seal or Sea-, 31, 71.
Bell-Frog, Green and Golden, 53.
bicarinatus, Astacopsis, 29.
bicarinatus, *Astacus*, 29.
Bicellaria annulata, 59.
Bicellaria ciliata, 59.
,, grandis, 59.
,, tuba, 59.
,, turbinata, 59.
biciliata, Crisia, 39.
bicornis, Calwellia, 46.
bicucullata, Furina, 32.
Biflustra delicatula, 57.
Biflustra fragilis, 57.
Biflustra perfragilis, 57.
Blackfish, Yarra, 27.
,, Gibbose, 27.
Black Snake, 1.
Black or Manna Cicada, Great, 50.
Black- and White-Ringed Snake, 52.
blacodes (?), *Genypterus*, 27.

Blue-spotted Eagle-Ray, 63.
Blue-tongued Lizard, Northern, 72.
Boa Antarctica, 12.
Boddaerti, Cyclodus, 72.
Botryoides, Lepralia, 38.
Bream, Australian, 4.
breviceps, Hippocampus, 65.
Brogniartii, Lepralia, 36.
Browni, Acanthopis, 12.
Brown Snake, Common, 23.
,, Shield-fronted, 23.
,, Small-scaled, 23.
Bugula avicularia, 78.
,, cucullata, 78.
,, dentata, 78.
,, neritina, 59.
,, robusta, 78.
Bull-Shark, Long-toothed, 64.
Buskii, Catenicella, 24.
,, Menipea, 58.
Butterfly-Gurnard, Spiny-sided, 5.

C.

Caleschara denticulata, 48.
callarias, Lotella, 19.
Calwellia bicornis, 46.
canaliculata, Lepralia, 37.
Cancer serratus, 15.
capensis, Carcharodon, 74.
Caranx trachurus, 18.
Carbasea, cyathiformis, 45.
Carbasea dissimilis, 45.
,, elegans, 45.
,, episcopalis, 45.
,, indivisa, 45.
,, pisciformis, 45.
Carcharias verus, 74.
Carcharius taurus, 64.
Carcharodon Rondeletii, 74.
Carcharodon Capensis, 74.
,, *lamia*, 74.
,, *verus*, 74.
carinata, Catenicella, 24.
,, Retepora, 94, 97.
Carpet Shark, 43.
,, Snake, 13.
Case-Moth, Lictor, 40.
,, Saunders', 40.
Casuarinæ, Agarista, 8.
Catenicella alata, 24.
,, amphora, 89.
,, aurita, 24.
,, Buskii, 24.
,, carinata, 24.
Catenicella concinna, 89.
Catenicella cornuta, 24, 90.
,, cribraria, 24.
,, crystallina, 24.
Catenicella Dawsoni, 24.
Catenicella elegans, 24.
,, formosa, 24.
,, fusca, 90.
,, geminata, 24.
,, Hannafordi, 24.
,, hastata, 24.
,, intermedia, 24, 89
Catenicella ævis, var., 24.
Catenicella lorica, 24.
,, margaritacea, 24.
,, perforata, 24.
,, plagiostoma, 24.
,, pulchella, 89.
,, rufa, 24.
Catenicella setigera, var., 24.
Catenicella umbonata, 90.
,, utriculus, 89.
,, ventricosa, 24.
,, Wilsoni, 89.
Cecilii, Lepralia, 35.
Cellaria fistulosa, 49.
,, gracilis, 49.
,, hirsuta, 49.
,, tenuirostris, 49.
Cellularia cuspidata, 58.
cellulosa, Dictyopora, 47.
Centropristes salar, 16, 17.
,, *Tasmanicus*, 16, 17.
,, *truttaceus*, 16, 17.
cerastinus, Acanthophis, 12.
cervicornis, Emma, 58.
cervicornis, Membranipora, 25.
,, Menipea, 58.
cheilodon, Lepralia, 37.
Chelemys Macquaria, 82, 83.
Chelodina longicollis, 92, 93.
Chelodina Novæ-Hollandiæ, 92, 93.
Chrysophrys Australis, 4.
Cicada, Great Black or Manna, 50.
,, Great Green, 50.
,, mærens, 50.
Cicada olivacea, 50.
Cidarites tubaria, 100.
ciliata, Bicellaria, 59.
,, Lepralia, 37.
,, Membranipora, 25.
cinerea, Euotaria, 31, 71.
cinerea, Otaria, 31, 71.
circinata, Lepralia, 35.
Cod, Australian Rock, 20.
,, Perch, Murray, 85, 86.
,, Small-scaled Rock, 19.
colonorum, Lates, 14.
Coluber porphyriacus, 1.
Common Australian Saw-Fish, 56.
,, Brown Snake, 23.
,, Sand-Frog, 42.
concinna, Catenicella, 89.
Copper-head Snake, 2.
cornuta, Catenicella, 24, 90.
,, Dimetopia, 46.
coronoides, Hoplocephalus, 11.
Crayfish, Murray, 15.
,, Yabber, 29.
,, Yabbie, 29.
Crenidens simplex, 73.
cribraria, Catenicella, 24.
Crisia acropora, 39.
,, biciliata, 39.
,, Edwardsiana, 39.
,, setosa, 39.
,, tenuis, 39.
Crisidia Edwardsiana, 39.
Crossorhinus barbatus, 43.

crystallina, Catenicella, 24.
crystallina, Lepralia, 35.
crystallina, Menipea, 58.
Ctenolates ambiguus, 84.
Ctenolates Macquariensis, 84.
cucullata, Bugula, 78.
curta, Naja, 3.
curtus, Hoplocephalus, 3.
cuspidata, Cellularia, 58.
Cuttlefish, Australian Tooth-cupped, 76, 77.
cyathiformis, Carbasea, 45.
cyathus, Menipea, 58.
Cyclochila Australasiæ, 50.
Cyclochila olivacea, 50.
Cyclodus Boddaerti, 72.
,, *flavigularis*, 72.
Cyclodus gigas, 72.
Cystignathus dorsalis, 42.

D.

Datnia (?) ambigua, 84.
Dawsoni, Catenicella, 24.
Day-Moth, Lewin's, 8.
,, Loranthus, 8.
,, Vine, 8.
Deaf Adder, 12.
Death Adder, 12.
delicatula, Biflustra, 57.
Delphinus Novæ Zealandiæ, 22.
dentata, Bugula, 78.
denticulata, Caleschara, 48.
denticulata, Eschara, 48.
denticulata Flustra, 45.
despecta, Entometa, 40.
Diachoris costata, 46.
,, Crotali, 46.
,, Magellanica, 46.
,, spinigera, 46.
diadema, Lepralia, 37.
diaphana, Lepralia, 35.
Dictyopora albida (avicularis), 66.
,, cellulosa, 47.
,, grisea, 66.
,, Wilsoni, 67.
Didymia simplex, 46.
Diemenia aspidorhyncha, 23.
,, microlepidota, 23.
,, superciliosa, 23.
Dimetopia cornuta, 46.
,, spicata, 46.
dispar, Eschara, 48.
,, Membranipora, 26.
dissimilis, Carbasea, 45.
Diura roseipennis, 79.
Dog-Fish, Picked, 75.
Dolphin, Yellow-sided, 22.
dorsalis, Cystignathus, 42.
dorsalis, Limnodynastes, 42.
Dragon, Leafy Sea-, 65.
Dules auratus, 84.
d'Urvillei, Eudoxyla, 30.

E.

Eagle-Ray, Blue-spotted, 63.
Earth-Worm, Australian Giant, 7.
Edwardsiana, Crisia, 39.
Edwardsiana, Crisidia, 39.
elegans, Carbasea, 45.
,, Catenicella, 24.
elegans, Eschara, 48.
elegans, Lepralia, 36.
elegans, Steganoporella, 60.
Ellerii, Lepralia, 37.
elongata, Metura, 40.
elongatus, Oiketicus, 40.
Emma cervicornis, 58.
Emys Macquaria, 82, 83.
Entometa despecta, 40.
,, ignobilis, 40.
episcopalis, Carbasea, 45.
Eschara denticulata, 48.
Eschara dispar, 48.
Eschara elegans, 48.
Eschara gracilis, 48.
,, mucronata, 48.
,, obliqua, 48.
,, platalea, 48.
,, quadrata, 48.
eucalypti, Zeuzera (Eudoxyla), 30.
Eudoxyla d'Urvillei, 30.
(Eudoxyla) eucalypti, Zeuzera, 30.
Euotaria cinerea, 31, 71.
excavata, Lepralia, 38.

F.

farciminoides, Salicornaria, 49.
ferox, Lepralia, 38.
Fish, Angel, 34.
,, Common Australian Saw-, 56.
,, Picked Dog-, 75.
fissa, Retepora, 94, 95.
fistulosa, Cellaria, 49.
flagellum, Hoplocephalus, 11.
flavigularis, Cyclodus, 72.
florea, Spiralaria, 46.
Flustra denticulata, 45.
Flustra Lacroixii, 26.
,, *lineata*, 26.
,, *membranacea*, 25.
,, *pilosa*, 25.
foliatus, Phyllopteryx, 65.
foliatus, Sygnathus, 65.
formosa, Catenicella, 24.
,, Retepora, 94, 97.
fragilis, Biflustra, 57.
Frog, Common Sand-, 42.
,, Green and Golden Bell-, 53.
,, Spotted Marsh-, 42.
Furina bicucullata, 32.
Furina-Snake, Two-hooded, 32.
Fur-Seal or Sea-Bear, 31, 71.
fusca, Catenicella, 90.

G.

Gadopsis gibbosus, 27.
,, gracilis, 27.
Galeus Australis, 64.
Genypterus Australis, 27.
Genypterus blacodes (?), 27.
,, *tigerinus*, 27.

geminata, Catenicella, 24.
Giant Earth-Worm, Australian, 7.
Gibbose Blackfish, 27.
gibbosus, Gadopsis, 27.
gigas, Cyclodus, 72.
gigas, Scincus, 72.
Gippslandica, Perichæta, 7.
Gippsland Perch, 14.
,, Water-Lizard, 81.
Girella simplex, 73.
Glycine, Agarista, 8.
Glycine, Phalænoides, 8.
Goat-Moth, Large Wattle, 30.
Golden Bell-Frog, Green and, 53.
Golden Perch, Murray, 84.
Goniocidaris tubaria, 100.
gracilis, Cellaria, 49.
,, Eschara, 48.
,, Gadopsis, 27.
gracilis, Salicornaria, 49.
grandis, Bicellaria, 59.
granulata, Retepora, 94, 99.
Great Black or Manna Cicada, 50.
,, Green Cicada, 50.
Green and Golden Bell-Frog, 53.
,, Cicada, Great, 50.
grisea, Adeona, 66.
grisea, Dictyopora, 66.
Grystes Macquariensis, 85, 86.
,, *Peeli*, 85, 86.
Gurnard, Spiny-sided, Butterfly-, 5.
,, Kumu, 6.
Gurnet-Perch, Banded Red, 33.
Gymnobelideus Leadbeateri, 91.

H.

Hammer-headed Shark, 56.
Hannafordi, Catenicella, 24.
Harpalyce, Papilio, 9.
Harpalyce, Pieris (Thyca), 9.
hastata, Catenicella, 24.
(Heptanchus) Notidanus Indicus, 43.
heterurus, Amphibolurus, 81.
Hippocampus breviceps, 65.
hirsuta, Cellaria, 49.
hirsuta, Onchopora, 49.
,, *Salicornaria*, 49.
hirsuta, Tubucellaria, 49.
hooded Furina-Snake, Two-, 32.
Hoplocephalus coronoides, 11.
,, curtus, 3.
,, flagellum, 11.
,, superbus, 2.
Horse-Mackerel, 18.
Horse, Short-headed Sea-, 65.
Hound, Australian Smooth-, 87.
Howitti, Physignathus Lesueri, var., 81.
Hydraspis Australis, 82, 83.
Hydrosaurus varius, 41.
Hyla Jacksoniensis, 53.

I.

Idmonea Australis, 68.
,, Milneana, 68.
,, radians, 68.
ignobilis, Entometa, 40.
Iguana, 41.
Indicus, Notidanus (Heptanchus), 43.
indivisa, Carbasea, 45.
intermedia, Catenicella, 24, 89.
iodomus, Tropidoderus, 69, 70.
Istiurus Lesueri, 81.

J.

Jacksoniensis, Hyla, 53.
,, *Ranoidea*, 53.

K.

Kumu Gurnard, 6.
,, Trigla, 6.

L.

Lace Lizard, 41.
Lacerta sincoides, 72.
,, *varia*, 41.
Lacroixii, Flustra, 26.
Lacroixii, Membranipora, 26.
lævis, Catenicella, var., 24.
lamia, Carcharodon, 74.
Large Pink-winged Phasma, 80.
,, Wattle Goat-Moth, 30.
larvalis, Lepralia, 37.
Lates Colonorum, 14.
laxa, Retepora porcellana, var., 94, 95.
Leadbeateri, Gymnobelideus, 91.
Leafy Sea-Dragon, 65.
Leopard Seal, Sea-, 21.
Lepidotrigla Vanessa, 5.
Lepralia anceps, 35.
,, Botryoides, 38.
,, Brogniartii, 36.
,, canaliculata, 37.
,, Cecilii, 35.
,, cheilodon, 37.
,, ciliata, 37.
,, circinata, 35.
Lepralia, crystallina, 35.
Lepralia diadema, 37.
,, diaphana, 35.
,, elegans, 36.
,, Ellerii, 37.
,, excavata, 38.
,, ferox, 38.
,, larvalis, 37.
,, lunata, 36.
,, Malusii, 36.
,, Maplestoni, 35.
,, marsupium, 35.
,, megasoma, 38.
,, monoceros, 38.
Lepralia mucronata, 48.
Lepralia papillifera, 37.
,, pellucida, 38.
,, perforata, 36.
,, pertusa, 36.
,, Schizostoma, 38.
,, subimmersa, 35.
,, trifolium, 37.
,, vitrea, 38.
,, vittata, 37.

leptonyx, *Phoca*, 21.
leptonyx, Stenorhynchus, 21.
Lesueri var. Howitti, Physignathus, 81.
Lesueri, *Istiuris*, 81.
,, *Lophura*, 81.
Lewini, Agarista, 8.
Lewin's Day-Moth, 8.
Lictor Case-Moth, 40.
Limnodynastes dorsalis, 42.
,, Tasmaniensis, 42.
lineata, *Flustra*, 26.
lineata, Membranipora, 26.
Ling, Australian Rock-, 27.
lipped Snake, White-, 11.
Little Whip-Snake, 11.
Lizard, Gippsland Water, 81.
,, Lace, 41.
,, Northern Blue-tongued, 72.
lobatus, *Squalus*, 43.
Lobster, Murray, 15.
longicollis, Chelodina, 92, 93.
longicollis, *Testudo*, 92, 93.
Long-necked River Tortoise, 92, 93.
Long-tailed Shark, Thresher or, 88.
Long-toothed Bull-Shark, or Shovel-nosed Shark, 64.
Lophura Lesueri, 81.
,, *Satiurus*, 81.
Loranthus Day-Moth, 8.
lorica, Catenicella, 24.
Lotella callarias, 19.
Ludrick, 73.
lunata (var.), Retepora monilifera, form munita, 94, 96.
lunulata, Lepralia, 36.

M.

Maccoyi, *Thynnus*, 44.
Mackerel, Horse-, 18.
,, Southern, 28.
Macquaria, *Emys*, 82, 83.
Macquaria, Chelymys, 82, 83.
Macquaria, *Platemys*, 82, 83.
Macquariensis, *Ctenolates*, 84.
Macquariensis, Grystes, 85, 86.
,, Oligorus, 85, 86.
mærens, Cicada, 50.
Magellanica, Diachoris, 46.
magnilabris, *Membranipora*, 60.
magnilabris, Seganoporella, 60.
malleus, Zygæna, 56.
Malusii, Lepralia, 36.
mamillaris, Membranipora, 25.
Manna Cicada, Great Black or, 50.
Maplestoni, Lepralia, 35.
margaritacea, Catenicella, 24.
marginata, *Perca*, 16, 17.
Marsh-Frog, spotted, 42.
marsupiata, *Retepora*, 95.
marsupium, Lepralia, 37.
Megascolides Australis, 7.
megasoma, Lepralia, 38.
membranacea, *Flustra*, 25.
membranacea, Membranipora, 25.
Membranipora cervicornis, 25.
Membranipora ciliata, 25.
,, dispar, 26.
,, Lacroixii, 26.
,, lineata, 26.
Membranipora magnilabris, 60.
Membranipora mamillaris, 25.
,, membranacea, 25.
,, perforata, 25, 36.
,, pilosa, 25.
,, Roselii, 26.
,, umbonata, 26.
,, Woodsii, 26.
Menipea Buskii, 58.
,, cervicornis, 58.
,, crystallina, 58.
,, cyathus, 58.
,, tricellata, 58.
Metura elongata, 40.
microlepidota, Diemenia, 23.
Milneana, Idmonea, 68.
Milesi, *Aulopus*, 54, 55.
monilifera, Retepora, 94, 95, 96.
,, ,, form munita, var. acutirostris, 94, 96.
,, ,, form munita, var. lunata, 94, 96.
,, ,, form munita, var. sinuata, 94, 96.
,, ,, form umbonata, 94, 97.
monoceros, Lepralia, 38.
Morelia variegata, 13.
Moth, Large Wattle Goat-, 30.
,, Lewin's Day-, 8.
,, Lictor Case-, 40.
,, Loranthus Day-, 8.
,, Saunders' Case-, 40.
,, Vine Day-, 8.
mucronata, Eschara, 48.
mucronata, *Lepralia*, 48.
munita (form), Retepora (monilifera var. acutirostris), 94, 96.
,, (form), Retepora (monilifera var. lunata), 94, 96.
Murray Cod-Perch, 85, 86.
,, Golden Perch, 84.
,, Lobster, 15.
,, Tortoise, 82, 83.
Mustelus Antarcticus, 87.
Myliobatis Australis, 63.

N.

Naja curta, 3.
Nautilus, Tuberculated Argonaut, or Paper-, 61, 62.
Nellia oculata, 49.
neritina, Bugula, 59.
nigroluteus, Cyclodus, 94.
nodosa, *Argonauta*, 61, 62.
Northern Blue-tongued Lizard, 72.
,, or Blotched Blue-tongued Lizard, 94.
Notidanus (Heptanchus) Indicus, 43.
Novæ-Hollandiæ, *Chelodina*, 92, 93.
Novæ Zealandiæ, Delphinus, 22.
nudipinnis, Pristiophorus, 56.

O.

obliqua, Eschara, 48.
Octopus raricyathus, 61, 62.
oculata, Nellia, 49.
Ocythoë raricyathus, 61, 62.
Odontaspis taurus, 64.
Officeri, Rhodona, 51.
Oiketicus elongatus, 40.
,, *Saundersi*, 40.
Oligorus Macquariensis, 85, 86.
olivacea, Cicada, 50.
,, *Cyclochila*, 50.
Onchopora hirsuta, 49.
Opercula of Retepora aurantiaca, 94.
,, ,, avicularis, 94.
,, ,, carinata, 94.
,, ,, fissa, 94.
,, ,, formosa, 94.
,, ,, granulata, 94.
,, ,, monilifera, 94.
,, ,, ,, form munita, var. acutirostris, 94.
,, ,, ,, form munita, var. lunata.
,, ,, ,, var. sinuata.
,, ,, ,, form umbonata.
,, ,, Phœnicea, 94.
,, ,, porcellana, 94.
,, ,, ,, var. laxa, 94.
,, ,, serrata, 94.
,, ,, tessellata, 94.
oryzata, Argonauta, 61, 62.
Otaria cinerea, 31, 71.

P.

Paper-Nautilus, Tuberculated Argonaut, or, 61, 62.
Papilio Harpalyce, 9.
papillifera, Lepralia, 37.
Peeli, Grystes, 85, 86.
pellucida, Lepralia, 38.
Perca marginata, 16, 17.
Perca trutta, 16, 17.
Perch, Banded Red Gurnet-, 33.
,, Gippsland, 14.
,, Murray Cod-, 85, 86.
,, ,, Golden, 84.
percoides, Scorpœna, 33.
percoides, Sebastes, 33.
perforata, Catenicella, 24.
,, Lepralia, 36.
,, Membranipora. 25, 36.
perfragilis, Biflustra, 57.
Perichæta Gippslandica, 7.
pertusa, Lepralia, 36.
Petralia undata, 60.
Phalœnoides glycine, 8.
Phasma, Red-shouldered, 69, 70.
,, Large Pink-winged, 80.
Phasma, violascens, 79.
Phasma, Violet-shouldered, 69, 70.
,, Violet-winged, 79.
Phoca leptonyx, 21.
Phœnicea, Retepora, 94, 98.
Phyllopteryx foliatus, 65.
Physignathus Lesueri, var. Howitti, 81.
Picked Dog-Fish, 75.
Pieris (Thyca) Aganippe, 10.
,, ,, Harpalyce, 9.
pilosa, Flustra, 25.
pilosa, Membranipora, 25.
Pink-winged Phasma, Large, 80.
pisciformis, Carbasea, 45.
plagiostoma, Catenicella, 24.
platalea, Eschara, 48.
Platemys Macquaria, 82, 83.
pneumatophorus, Scomber, 28.
Podacanthus typhon, 80.
porcellana, Retepora, 94, 95.
,, var. laxa, Retepora, 94, 95.
porphyriacus, Coluber, 1.
porphyriacus, Pseudechys, 1.
Potamobius serratus, 15.
Pristiophorus nudipinnis, 56.
Pseudechys porphyriacus, 1.
Pseudoelaps superciliosus, 23.
Pseudophysis barbatus, 20.
pulchella, Catenicella, 89.
purpurisatus, Aulopus, 54, 55.

Q.

quadrata, Eschara, 48.

R.

radians, Idmonea, 68.
Rana aurea, 53.
Ranoidea aurea, 53.
Ranoidea Jacksoniensis, 53.
raricyathus, Octopus, 61, 62.
,, *Ocythoë*, 61, 62.
Ray, Blue-spotted Eagle-, 63.
Red Gurnet-Perch, Banded, 33.
Red-shouldered Phasma, 69, 70.
Retepora, aurantiaca, 94, 98.
,, avicularis, 94, 95.
,, carinata, 94, 96.
,, fissa, 94, 95.
,, formosa, 94, 97.
,, granulata, 94, 99.
,, laxa (var.), porcellana, 94, 95.
,, monilifera, 94, 95, 96.
,, ,, form munita, var. acutirostris, 94, 96.
,, ,, form munita, var. lunata, 94, 96.
,, ,, var. sinuata, 94, 96.
,, ,, form umbonata, 94, 97.
,, Phœnicea, 94, 98.
,, porcellana, 94, 95.
,, ,, var. laxa, 94.
,, serrata, 94, 99.
,, tessellata, 94, 99.
Rhina squatina, 34.
rhodomus, Tropidoderus, 69, 70.
Rhodona Officeri, 51.
,, Victorian, 51.
Ringed Snake, Black- and White-, 52.
River Tortoise, Long-necked, 92, 93.
robusta, Bugula, 78.

Rock Cod, Australian, 20.
,, Small-scaled, 19.
Rockling, Australian, 27.
Rondeletii, Carcharodon, 74.
roseipennis, Diura, 79.
Rosselii, Membranipora, 26.
rufa, Catenicella, 24.

S.

salar, Centropristes, 16, 17.
Salicornaria farciminoides, 49.
,, *gracilis*, 49.
,, *hirsuta*, 49.
,, *tenuirostris*, 49.
Salmon Arripis, 16, 17.
,, Trout, 16, 17.
Sand-Frog, Common, 42.
Satiurus Lesueri, 81.
Saunders' Case-Moth, 40.
Saundersi, Oiketicus, 40.
Saw-Fish, Common Australian, 56.
Schizostoma, Lepralia, 38.
scincoides, Lacerta, 72.
Scincus gigas, 72.
Scomber pneumatophorus, 28.
Scomber thynnus, 44.
,, *trachurus*, 18.
Scorpœna percoides, 33.
Sea-Bear or Fur-Seal, 31, 71.
Sea-Dragon, Leafy, 65.
Sea-Horse, Short-headed, 65.
Sea-Leopard Seal, 21.
Seal, Sea-Bear or Fur-, 31, 71.
,, Sea-Leopard, 21.
Sebastes percoides, 33.
Sepioteuthis Australis, 76, 77.
Sergeant Baker, 74, 75.
serrata, Retepora, 94, 99.
serratus, Astacoides, 15.
serratus, Cancer, 15.
,, *Potamobius*, 15.
setigera, var. Catenicella, 24.
setosa, Crisia, 39.
Seven-Gilled Shark, 43.
Shark, Australian Tope, 64.
,, Carpet, 43.
,, Hammer-headed, 56.
,, Long-tailed, or Thresher, 88.
,, Long-toothed Bull-, or Shovel-nosed, 64.
,, Seven-Gilled, 43.
,, Thresher, or Long-tailed, 88.
,, Tope, 64.
,, White, 74.
Shield-fronted Brown Snake, 23.
Short-headed Sea-Horse, 65.
Shovel-nosed Shark, or Long-toothed Bull-Shark, 64.
simplex, Crenidens, 73.
simplex, Didymia, 46.
,, Girella, 73.
sincoides, Lacerta, 72.
sinuata (var.), Retepora monilifera, 94.
Small-scaled Brown Snake, 23.
,, Rock Cod, 19.
Smooth-Hound, Australian, 87.
Snake, Black, 1.
,, Black- and White-Ringed, 52.
,, Brown, Common, 23.
,, ,, Shield-fronted, 23.
,, ,, Small-scaled, 23.
,, Carpet, 13.
,, Common Brown, 23.
,, Copper-head, 2.
,, Little Whip-, 11.
,, Shield-fronted Brown, 23.
,, Small-scaled Brown, 23.
,, Tiger, 3.
,, Two-hooded Furina-, 32.
,, Whip-, Little, 11.
,, White-lipped, 11.
Southern, or Blotched Blue-tongued Lizard, 94.
,, Mackerel, 28.
spicata, Dimetopia, 46.
spinifer, Astacoides, 15.
spinigera, Diachoris, 46.
Spiny-sided Butterfly-Gurnard, 5.
Spiralaria florea, 46.
Spotted Eagle-Ray, Blue-, 63.
,, Marsh-Frog, 42.
Squalus acanthias, 75.
,, *appendiculatus*, 43.
,, *barbatus*, 43.
,, *lobatus*, 43.
,, *squatina*, 34.
,, *vulpes*, 88.
,, *zygœna*, 56.
squatina, Rhina, 34.
squatina, Squalus, 34.
Steganoporella elegans, 60.
Steganoporella magnilabris, 60.
Stenorhynchus leptonyx, 21.
Stirparia annulata, 59.
subimmersa, Lepralia, 35.
superbus, Hoplocephalus, 2.
superciliosa, Diemenia, 23.
superciliosus, Pseudoelaps, 23.
Sygnathus foliatus, 65.
,, *tœniolatus*, 65.

T.

Tasmanicus, Centropristes, 16, 17.
Tasmaniensis, Limnodynastes, 42.
taurus, Carcharius, 64.
taurus, Odontaspis, 64.
tenuirostris, Cellaria, 49.
tenuirostris, Salicornaria, 49.
tenuis, Crisia, 39.
tessellata, Retepora, 94, 99.
Testudo longicollis, 92, 93.
Tettigonia Australasiæ, 50.
Thersites altivelis, 44.
Thersites atun, 44.
Thresher, or Long-tailed Shark, 88.
(Thyca) Pieris Aganippe, 10.
,, ,, Harpalyce, 9.
Thynnus Maccoyi, 44.
,, *Scomber*, 44.
Thynnus thynnus, 44.
Thynnus vulgaris, 44.
tigerinus, Genypterus, 27.
Tiger Snake, 3.

tæniolatus, Sygnathus, 65.
Tooth-cupped Cuttlefish, 76, 77.
Tope Shark, Australian, 64.
Tortoise, Long-necked River, 92, 93.
,, Murray, 82, 83.
trachurus, Caranx, 18.
,, *Scomber*, 18.
Trachurus trachurus, 18.
tricellata, Menipea, 58.
trifolium, Lepralia, 37.
Trigla Kumu, 6.
Tropidoderus iodomus, 69, 70.
,, rhodomus, 69, 70.
Trout, Salmon, 16, 17.
trutta, Perca, 16, 17.
truttaceus, Arripis, 16, 17.
truttaceus, Centropristes, 16, 17.
tuba, Bicellaria, 59.
tubaria, Cidarites, 100.
tubaria, Goniocidaris, 100.
tuberculata, Argonauta, 61, 62.
Tuberculated Argonaut, or Paper Nautilus, 61, 62.
tuberculosa, Argonauta, 61, 62.
Tubucellaria hirsuta, 49.
Tunny, 44.
turbinata, Bicellaria, 59.
Two-hooded Furina-Snake, 32.
typhon, Podacanthus, 80.

U.

umbonata, Catenicella, 90.
,, Membranipora, 25.
,, (form), Retepora monilifera, 94, 97.
undata, Petralia, 60.
utriculus, Catenicella, 89.

V.

Vanessa, Lepidotrigla, 5.
varia, Lacerta, 41.
variegata, Morelia, 13.
varius, Hydrosaurus, 41.
ventricosa, Catenicella, 24.
Vermicella annulata, 52.
verus, Carcharias, 74.
,, *Carcharodon*, 74.
Victorian Rhodona, 51.
Vine Day-Moth, 8.
violascens, Acrophylla, 79.
violascens, Phasma, 79.
Violet-shouldered Phasma, 69, 70.
Violet-winged Phasma, 79.
Vipera acanthophis, 12.
vitrea, Lepralia, 38.
vittata, Lepralia, 37.
vulgaris, Acanthias, 75.
vulgaris, Thynnus, 44.
vulpes, Alopecias, 88.
vulpes, Squalus, 88.

W.

Water Lizard, Gippsland, 81.
Wattle Goat-Moth, Large, 30.
Whip-Snake, Little, 11.
White-lipped Snake, 11.
White-Ringed Snake, Black- and, 52.
White Shark, 74.
Wilsoni, Catenicella, 89.
Wilsoni, Dictyopora, 67.
Woodsii, Membranipora, 26.
Worm, Australian Giant Earth-, 7.

Y.

Yabber Crayfish, 29.
Yabbie Crayfish, 29.
Yarra Blackfish, 27.
Yellow-sided Dolphin, 22.

Z.

Zeuzera (Eudoxyla) eucalypti, 30.
Zygæna malleus, 56.
zygæna, Squalus, 56.

CORRIGENDA ET ADDENDA.

Letterpress of Plate 42, for *Lymnodynastes*, read *Limnodynastes.*

Letterpress of Plates 16, 17—References, for *? Perca trutta* (Cuv. & Val.), Hist. Nat. des Poiss., v. 4, p. 54, read vol. 2; add *Perca marginata* (Cuv. & Val.), Hist. Nat. des Poiss., v. 2, p. 53.

By Authority: John Ferres, Government Printer, Melbourne.

Natural History of Victoria.

PRODROMUS

OF THE

ZOOLOGY OF VICTORIA;

OR,

FIGURES AND DESCRIPTIONS OF THE LIVING SPECIES OF ALL CLASSES

OF THE

VICTORIAN INDIGENOUS ANIMALS.

DECADE I.

BY

FREDERICK McCOY,

HONORARY FELLOW OF THE CAMBRIDGE PHILOSOPHICAL SOCIETY; CORRESPONDING MEMBER OF THE ZOOLOGICAL SOCIETY OF LONDON; HONORARY MEMBER OF SEVERAL OTHER SCIENTIFIC SOCIETIES, ETC.
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MDCCCLXXVIII.

PREFACE.

It having been considered desirable to ascertain accurately the natural productions of the Colony of Victoria, and to publish works descriptive of them, on the plan of those issued by the Governments of the different States of America, investigations were undertaken, by order of the Victorian Government, to determine the Geology, Botany, and Zoology of the colony, to form collections illustrative of each for the public use, and to make the necessary preparations for such systematic publications on the subject as might be useful and interesting to the general public, and contribute to the advancement of science.

As the geological and botanical investigations have already approached completion, and their publication is far advanced, it has been decided to now commence the publication of the third branch completing the subject, namely, that of the Zoology or indigenous members of the different classes of the animal kingdom.

As the Fauna is not so well known as the Flora, it was a necessary preliminary to the publication to have a large number of drawings made, as opportunity arose, from the living or fresh examples of many species of reptiles, fish, and the lower animals, which lose their natural appearance shortly after death, and the true characters of many of which were consequently as yet unknown, as they had only been described from preserved specimens. A Prodromus, or preliminary issue, in the form of Decades or numbers of ten plates, each with its complete descriptive letterpress, will be published, of such illustrations as are ready, without systematic order or waiting for the completion of any one branch. The many good observers in the country will thus have the means of accurately identifying

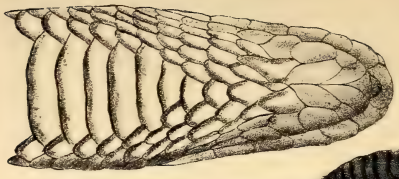
various natural objects, their observations on which, if recorded and sent to the National Museum, where the originals of all the figures and descriptions are preserved, will be duly acknowledged, and will materially help in the preparation of the final systematic volume to be published for each class when it approaches completion.

This first Decade gives figures and descriptions in the first three plates of three of the most dangerous of our poisonous snakes, which it is of much interest and importance for observers to be able to identify exactly when reporting the effects of their bites, or of the medical treatment, which, to be profitably discussed, must be based on an accurate determination of the species of snake referred to. The three next plates illustrate the living characteristics of some of our native fish. The seventh plate represents the new gigantic earthworm, five or six feet long, so abundant in the rich soils of Brandy Creek. The eighth plate is devoted to three species of day-moth, or *Agarista*, with their transformations, of which that so seriously destructive to our vineyards is discriminated from the harmless sorts, so that efforts for destruction of the one may not be wasted on the others. The last two plates show the character and metamorphosis of two species of diurnal *Lepidoptera*.

The succeeding Decades will illustrate as many different genera as possible, and will deal first usually with species of some special interest, and of which good figures do not exist, or are not easily accessible.

FREDERICK McCOY.

24th June 1878.



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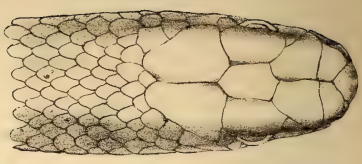

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A. Bartholomew, del, E. Gilks, lith.

Prof. M.c Coy, direct.

J. M. Ferguson, imp.

Printed at the Mining & Geological Depart.t Government Printing Office, Melbourne.

PLATE 1.

PSEUDECHYS PORPHYRIACUS (SHAW SP.).

THE BLACK SNAKE.

[Genus PSEUDECHYS (WAGLER). (Sub-kingd. Vertebrata. Class Reptilia. Order Ophidia. Fam. Elapidæ.)

Gen. Char.—Body and tail moderately elongate, gradually tapering. Head subquadrate, flattened above and at the sides, obtusely rounded in front, little wider than the neck behind; no loreal plate; one anterior ocular plate forms the front margin of the orbit, and two posterior oculars its hind edge; two nasal plates with the nostril between them; scales of the back flat, smooth, in about 17 rows; anal plate double, a variable number of the anterior subcaudal plates in one row, behind which they form two rows. Confined to Australia.]

DESCRIPTION.—Scales of back in 17 rows; abdominal plates about 180; single row of anterior subcaudals about 12, posterior ones in two rows of about 40 each; color of head, back, and tail, purplish-black or dark-slate color; the lateral row of body scales on each side and the abdominal plates rich carmine-lake red, with hind tips and edges blackish; the under side of head and the under side of the tail lighter than the back. Length of body about 5 feet, tail about 6 inches, head or gape about 1 inch.

REFERENCE.—*Coluber porphyriacus* (Shaw), Gen. Zool. v. 3, t. 110. *Pseudechys id.* Wagler Syst. Amphib. p. 171.

This is the most beautiful of all the Victorian snakes, and one of the most deadly in the effects of its bite. It is, however, fortunately much rarer in Victoria than in the warmer more northern colonies of Australia; and although not uncommon near the northern Murray boundary it is seldom found in the cooler southern districts, and is not known at all in Tasmania. The only locality near Melbourne where it is not very uncommon is Studley Park, where in the bend of the Yarra the specimen here figured and some others I have seen were killed.

Like the other genera of the family *Elapidæ*, the poison-fang in *Pseudechys* is grooved on the front face for the duct of the poison gland, which opens near the point, and, as in the family generally, there are a few small harmless solid teeth behind the fang in the upper jaw, besides two rows on the palate, and the usual row of small hooked solid teeth on the lower jaws. The anterior series of subcaudal scales being in one row, and the posterior ones in two rows, is a character readily separating the

genus from the allied forms. There are only two species known, the present black and red one, and a brown one, the specific distinction of which is doubted by some observers.

Some fatal cases of snake-bite in man from this species are known, and a large-sized dog will usually die in an hour from the effects of its bite.

When irritated it can flatten and widen the neck by raising some of the anterior ribs.

To show the variations in the numbers of the scales, &c., the following examples from specimens in the National Museum are given, indicating the extreme variations, from 7 to 16, particularly of the single row of subcaudal plates, and the constancy of the rows of scales across the middle of the back.

—	Entire Length.	Tail.	Gape.	Subcaudal Plates.	Abdominal.	Rows of Scales across—		
						Neck.	Middle.	Base of Tail.
	ft. in.	in.	in.					
1. Large specimen figured ...	4 9½	6¼	1 1/16	11 35/35	182	21	17	17
2.	4 9½	8	1 1/16	16 39/39	185	21	17	17
3. Small specimen	1 0	2	9/16	14 41/41	182	21	17	17
4.	2 1¾	4⅛	¾	7 48/48	185	21	17	17

The Black Snake may be said to be rare in Victoria, except near the northern boundary. The chief food of this species is formed of frogs, lizards, mice, and other small mammals. It retires into holes in the ground during the winter months, from May, until the warmth of spring brings it forth again. The young are colored like the adult, and are usually about 16 or 18 in number.

Explanation of Figures.

Plate 1.—Fig. 1, large specimen one-half natural size. Fig. 1*a*, under side of tail of same specimen to show the double anal plate, the anterior subcaudal plates in one row, and the posterior ones in two rows, two-thirds the natural size. Fig. 2, side view of head of another specimen, showing the rostral plate, nasal plates, anterior ocular plate, two posterior ocular plates, superciliary plate, and upper and lower labial plates, one-third larger than nature. Fig. 2*a*, front view of same specimen, showing the form of top of the head and rostral plate, one-third larger than nature. Fig. 2*b*, inner view of palate of same specimen, showing the two poison-fangs, with the three small solid teeth behind each, on each side, and the two long rows of small solid teeth pointing backwards on the palate, one-third larger than nature. Fig. 2*c*, same specimen seen from above, showing the form and proportions of the rostral plate, anterior pair of frontal plates, posterior pair of frontal plates, two superciliary plates, pair of occipital plates, and the vertex plate, one-third larger than nature. Fig. 2*d*, same specimen seen from below, showing the chin plates, one-third larger than nature.

Frederick McCoy.

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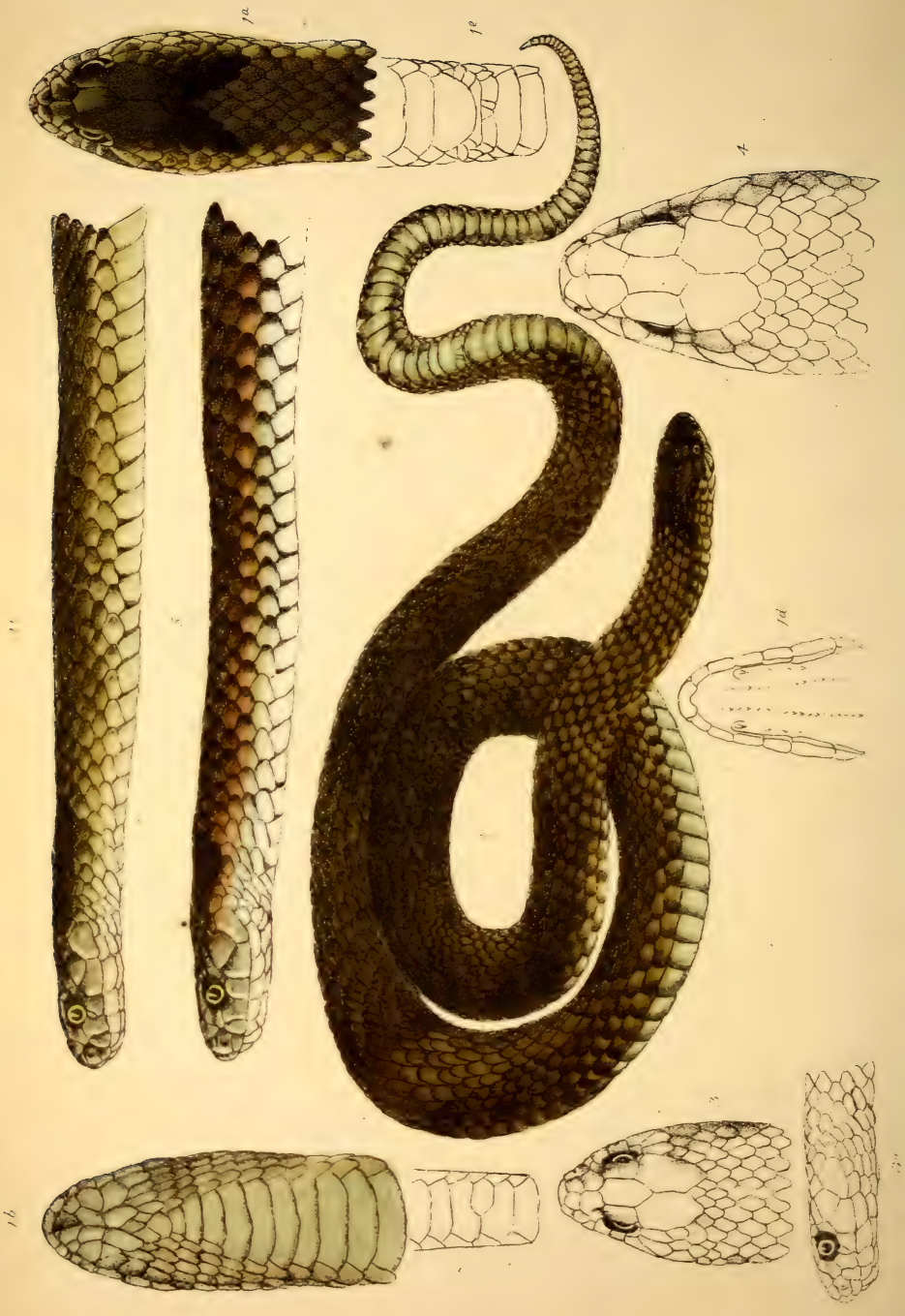


A. Bartholomew, del.

Prof. M.c Coy, direx.

F. Schuster, lith.

PLATE 2.

HOPLOCEPHALUS SUPERBUS (GÜNTH.).

THE COPPER-HEAD SNAKE.

[Genus HOPLOCEPHALUS (CUV.) (Sub-kingd. Vertebrata. Class Reptilia. Order Ophidia. Fam. Elapidæ.)

Gen. Char.—Body and tail moderately thick, gradually tapering. Head subquadrate, depressed, rounded in front; rostral plate moderate; no loreal plate; one anterior and two posterior ocular plates; one nasal plate pierced by the nostril. Scales of back smooth, about 15 to 21 rows; anal and subcaudal plates entire, in one row. Confined to Australia.]

DESCRIPTION.—Vertex plate hexagonal, about twice as long as broad. Fifteen rows of dorsal scales across the middle of the back; ventral plates, 147 to 157; subcaudal plates, 41 to 50 (about); color of back varying from a dark-brown to light reddish-brown, or nearly black, the tip of each scale blackish; top of head of a dark copper blackish bronze, with two diverging darker extensions forming a V-shaped black patch on neck; outer row of scales on each side, with a conspicuous white patch on anterior half of each, the tip being blackish; one or two next outer lateral rows of scales light brick-red for about one-third of their length, the anterior part being lighter and the tip of each blackish. Under side very pale yellowish-olive in front, becoming dark-grey or blackish on middle and tail; hind edge of ventral plates dark-grey and sometimes with a slight reddish line; plates of sides of the head closely freckled with olive-brown, but each with a conspicuous narrow white anterior margin.

REFERENCE.—(Günther) Cat. Colub. Snakes, p. 217.

To show the constancy of the number of rows of scales across the middle of the back, and the variation of the ventral and subcaudal plates, I subjoin particulars of five specimens in the National Museum :—

	Number of Rows of Scales on Back.			Plates.		Total.		
	Neck.	Middle.	Base of Tail.	Ventral.	Subcaudal.	Length.	Tail.	Gape.
						ft. in.	in.	in.
1 specimen ...	13	15	13	147	41	2 5	$4\frac{1}{4}$	$\frac{3}{4}$
2 „ ...	17	15	13	154	44	3 4	$6\frac{1}{4}$	$1\frac{1}{16}$
3 „ ...	15	15	13	154	49	2 0	$4\frac{1}{2}$	$1\frac{1}{16}$
4 „ ...	17	15	13	157	50	3 0	$6\frac{1}{2}$	$\frac{7}{8}$
5 „ ...	17	15	13	152	47	3 8	$6\frac{1}{2}$	...

This species was long supposed to be confined to Tasmania, where it is very abundant; and my first announcement* of its occurrence on the mainland near Melbourne was supposed by subsequent writers on the subject in New South Wales and London to be erroneous; these writers, however, now (without referring to their former criticisms) quote it as an undoubted Victorian species. In point of fact, it is very common about Prahran, Elsternwick, and other south-eastern suburbs of Melbourne, but its range seems very restricted, specimens not having yet been recorded from the north or western parts of the colony. The numerous young are brought forth in December and January.

The blackish examples, especially if the reddish color of the side scales and edges of ventrals is distinct, are frequently mistaken for the Black Snake; but the scales on the under side of the tail being only in a single row throughout, and there being one instead of two nasal plates, easily distinguish them.

A large number of the dangerous cases of snake-bites near Melbourne are due to this species, which for its size is extremely venomous. One remarkable case excited much attention a few years ago, when a station-master named Brown, on the Hobson's Bay Railway at Elsternwick, was bitten by a small individual of this species, which some workmen imagined they had killed, and after carrying it some distance hanging across a stick, threw it upon the platform, when Brown, taking it up, received a small wound in the finger, and shortly showed the usual symptoms of fatal snake-poisoning. In spite of the ordinary remedies, of excision of the bitten part, rubbing ammonia on the wound, ligatures, and sucking the wound, doses of brandy, galvanism, and being walked about by assistants, he was so completely at the point of death that the two surgeons attending him gave him up, his sight being gone, his lower extremities completely paralysed, having dilated pupils, swollen neck and face, and coma, from which he could not be roused. The medical attendants, explaining to his friends that they could do no more, and that his death might be looked for in a few minutes, proposed to try what was then considered the dangerous remedy

* "Recent Zoology and Palæontology of Victoria," International Exhibition Essays, Melbourne, 1866–7.

of injecting strong liquor of ammonia into a vein, as advocated by Professor Halford. On this being done by Dr. Halford, who was sent for, to the astonishment of all present, the man instantly recovered consciousness, the pupils of his eyes contracted, and, sitting up, he recognised his wife and child and friends, and asked some questions about domestic matters, after having been cold, incapable of seeing, hearing, speaking, or moving, and almost pulseless for hours. He soon recovered, and remained on daily duty until lately.*

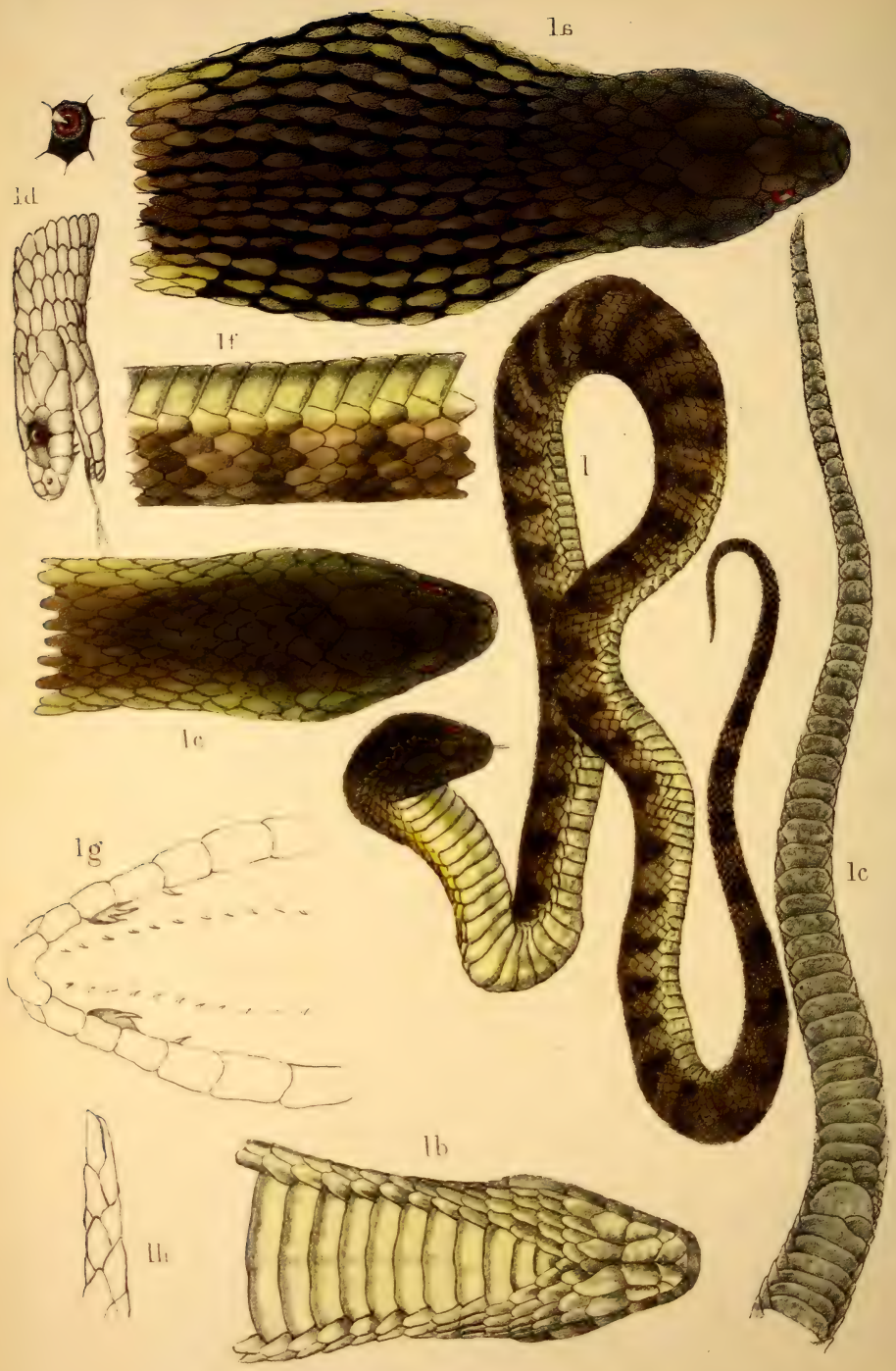
I have adopted the popular name "copper-head" for this snake from a well-known vendor of a supposed antidote for snake-bites, who used to go about the streets with several specimens of this species in the bosom of his shirt, protruding now and then around his neck. On the evening of the last day on which I saw this, he was induced to cause one of them to bite him, to show the value of his antidote, and was dead in a few hours. The color of the head is like that of an old dark copper coin. In Tasmania the name "Diamond Snake" is unfortunately given to this species, for that name properly belongs to a perfectly harmless snake of New South Wales, so that the numerous experiments made in former years in Tasmania to test the value of some pretended antidote, were supposed in London to have been made with the true harmless Diamond Snake, instead of, as was the case, with this very poisonous kind.

Explanation of Figures.

Plate 2.—Fig. 1, rather light-colored specimen, two-thirds natural size. Fig. 1*a*, head of same specimen, natural size, viewed from above, showing the length and form of the vertex plate, with other plates of the head and the form of the V-shaped dark mark on back of neck, natural size. Fig. 1*b*, head of same specimen viewed from below, showing the chin plates and lower labials, natural size. Fig. 1*c*, side view of portion of same specimen, natural size. Fig. 1*d*, interior of palate of same specimen, natural size, showing the rostral and labial plates, the two long rows of small solid teeth on palate, the two poison fangs, and three smaller solid teeth after an interval behind each. Fig. 1*e*, portion of underside of same specimen, natural size, showing the last ventral plates, the first subcaudals, and the anal plate. Fig. 2, portion of tail of another specimen, natural size, showing an odd intercalated plate on one side. Fig. 3, head of another specimen, natural size, showing the vertex plate more acutely pointed in front than usual. Fig. 3*a*, side view of same specimen, showing the single nasal plate pierced by the nostril. Fig. 4, plates of upper part of head, one-third larger than nature, to show the elongate narrow usual form of the vertex plate. Fig. 5, side view of rather pale reddish specimen, natural size.

Frederick McCoy.

* Some account of this and forty other cases of similarly treated snake-bites will be found in the Australian Medical Journal for March 1875.


1a
1d
1f
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1c
1g
1c
1b
1h

PLATE 3.

HOPLOCEPHALUS CURTUS (SCHLEGEL SP.).

THE TIGER SNAKE.

[Genus HOPLOCEPHALUS (CUV.). (Sub-kingd. Vertebrata. Class Reptilia. Order Ophidia. Fam. Elapidæ.)

Gen. Char.—Body and tail moderately thick, gradually tapering. Head subquadrate, depressed, rounded in front. Rostral plate moderate; no loreal plate; one anterior and two posterior ocular plates; one nasal plate pierced by the nostril. Scales of back smooth, about 15 to 21 rows. Anal and subcaudal plates entire, in one row. Confined to Australia.]

DESCRIPTION.—Usually 19 (rarely 17 or 18) rows of scales on middle of body; body varying from brownish-olive to light yellowish-brown above, with about 38 to 50 darker brown dusky undefined transverse bands, about 2 (or rarely 3 or 4) scales broad, with a rather narrower interval between them. Head darker olive bronze; chin plates freckled with bright blue; throat and belly varying from rich king's-yellow to pale straw-yellow; the edges of the ventral plates lightly freckled with grey in the anterior part of the body, the grey almost excluding the yellow and whitish on the subcaudals and posterior part of belly. In some specimens the yellow is almost whitish or cream color, and the grey mottling becomes almost black towards under side of tail. Vertex head-plate sub-pentagonal, varying from one-fifth to one-fourth longer than wide. The belly is flat, and the back obtusely angulated, most so towards base of tail; tail conic.

A large specimen from the junction of the Murray and Darling, with total length from snout to tip of tail of 3 feet $\frac{1}{4}$ inch; length of gape, 1 inch; tail, $5\frac{1}{4}$ inches; has 15 rows of scales at back of neck, 17 at middle, and 14 near base of tail; the subcaudals, 46; ventrals, 168; and about 50 bands. A small specimen from same place—Total length, $13\frac{1}{4}$ inches; tail, $2\frac{1}{4}$ inches; has 15 rows of scales at neck, 17 at middle, and 13 at base of tail; subcaudals, 54; ventrals, 168; and 50 bands. Small specimen from same place—Length from tip to tip, 1 foot $3\frac{1}{4}$ inches; tail, $2\frac{1}{2}$ inches; gape, $\frac{5}{8}$ inch; has 17 rows of scales at neck, 19 at middle, and 15 at base of tail; its bands are as wide as the length of $2\frac{1}{2}$ scales; ventral scales, 168; subcaudals, 50. One moderate sized (the figured) specimen from Prahran, measuring from tip to tip 32 inches; tail, 5 inches; has 17 rows of scales at neck, 19 in the middle, 13 near base of tail, and 49 subcaudals. A very large specimen from junction of Murray and Darling—4 feet 2 inches; tail, $4\frac{1}{4}$ inches; has 4 small teeth behind each fang; vertex plate one-fourth longer than wide, more numerous bands becoming obsolete towards the tail; 15 rows of scales on neck, 17

in middle of body, 169 ventrals, and 36 subcaudals. The details of four other specimens are here tabulated to show observed variations :—

	No. of Rows of Scales on Back.			Ventral Plates.	Sub-caudals.	Total Length.	Tail.	Gape.
	Neck.	Middle.	Base of Tail.					
						ft. in.	in.	in.
1	17	19	15	169	48	3 6	$6\frac{1}{2}$	$1\frac{1}{8}$
2	16	19	15	173	48	3 0	$5\frac{1}{2}$	1
3	17	18	13	168	47*	2 $4\frac{1}{2}$	...	...
4	18	19	14	178	50	2 5	$4\frac{1}{2}$	...
5	18	19	13	169	48	2 8	5	1

* Two imperfectly developed, one between scales 20 and 21; the other between 25 and 26.

REFERENCE.—*Naja curta* (Schlegel), Essai sur la Physionomie des Serpens, p. 486. Abbildung, t. 48, f. 19, 20.

This species, which goes under the colonial name in Victoria of Tiger Snake from its tawny cross-banded coloring, and ferocity, is well-known to frequently inflict bites rapidly fatal to men and dogs, and is extremely vicious in disposition, reminding us strongly of its near ally, the *Cobra di capello* of India, like which it flattens and extends the skin of the side of the neck laterally when irritated, to twice its width when quiet; the black stretched skin being then very visible between the separated scales. It is common, especially in marshy places and near river-banks about Melbourne, and in most parts of the colony, as well as extending far beyond it to the warm north, and just as abundantly to the cool south in Tasmania.

The bands vary very much in distinctness, and are often very obscure towards the head and tail; in some specimens they are rendered very conspicuous by an extension of some of the yellowish color of the belly on to two or three rows of the lateral scales between the ends of the bands. The blue on the chin is rarely seen, and soon disappears in specimens in spirit, exhibiting it when alive. As in all snakes, the colors are most vivid just after casting the skin, and are darker and the markings less distinct before it. The fangs are single or double, small, under the junction of the second and third labial plates; one or two (rarely four) smaller teeth under the anterior part of the fourth labial plate. Iris orange; the pupil seems circular, and not vertically elongate, as Schlegel states in his "*Essai sur la Physionomie des Serpens.*"

In Tasmania this is popularly called "Carpet Snake," a name which properly belongs to the harmless snake so called on the mainland. In this case, as with the *H. superbus*, the Tasmanian experiments on the treatment of bites from this highly poisonous species were unintelligible in Europe from the misuse of the established popular name of a different and innocuous form.

The greater number of cases of fatal snake-bites to men and dogs near Melbourne, and most of the experiments by Professor Halford and others to test the power of the poison, and the efficacy of the injection of ammonia into the blood, and other modes of treatment, refer to this species, which is by far the most abundant of all the dangerous snakes of the colony. In Dr. Halford's experiments at the University of Melbourne, of 31 dogs bitten by captive Tiger Snakes, 27 died and 4 recovered ; the deaths occurring, on the average, in 2 hours 2 minutes. Deputy-Inspector-General Macbeth, causing in India 29 dogs to be bitten by Cobras, found they all died, on the average, in 2 hours 42 minutes, showing that, contrary to the expressed opinion of many Indian practitioners, the Australian Tiger Snake bite is more rapidly fatal than that of the Cobra. Dr. McCrae, the Chief Medical Officer of Victoria, caused 14 dogs to be bitten by this species of snake, and none recovered. No remedies were used in any of these three sets of cases. The number of deaths of human beings in the colony from snake-bite in the year is very small ; but some of the cases given in the *Australian Medical Journal* for March 1875 are interesting from the bites being publicly given in Melbourne, and the precise times noted both of the bite and the death of the man. One, a police magistrate, bitten on the arm by a Tiger Snake, died in 24 hours ; a man named Underwood, a well-known vendor of a supposed antidote, was bitten in public by one of this species, and was dead within an hour ; another man named Cartwright, exhibiting some of these snakes, was bitten and also died within an hour. Dr. Casey, of Brighton, reported a case in which the man died within half an hour of the bite ; and a man named Griffiths, handling some of these snakes as an exhibition at the Port Phillip Club Hotel, was bitten by a Tiger Snake, and died in less than half an hour. The symptoms seem to be much alike in all cases of snake-bite, viz. :—At first

faintness and often slight convulsions, then sickness of the stomach (probably a reflex action from the brain), with trembling and weakness in the limbs; the pupils of the eyes dilated, a tendency to sleep, and then total paralysis and coma immediately preceding death.

The young of the Tiger Snake are about thirty in number, like the adult in all respects, and brought forth in January. The general food of the Tiger Snake is composed of frogs, lizards, and mice, &c. On one occasion, however, I put a live mouse into a box in which I had a Tiger Snake, to feed it, and was astonished to find next morning that the mouse had killed the snake by biting the back of its neck, and had eaten some of its flesh. Keeping some of these snakes together in a box, I frequently noticed them bite each other viciously when stirred up, without the poison-fangs producing any ill effect.

Explanation of Figures.

Plate 3.—Fig. 1, view of entire of average specimen, half the natural size. Fig. 1*a*, head of same specimen viewed from above when the neck is flattened out, while irritated and preparing to bite, the jet-black skin visible between the separated scales; showing also the wide nearly pentagonal vertex plate, sub-truncate in front and nearly as wide as long. Fig. 1*b*, under side of same specimen, showing the blue freckling and form of the chin plates. Fig. 1*c*, view from above of same specimen when not irritated, the neck being of the usual undisturbed width, and the scales in contact with each other, so as to hide the black skin exposed in Fig. 1*a*. Fig. 1*d*, side view of same specimen, showing the single nasal plate pierced in the middle by the nostril, the anterior ocular, and the two posterior ocular plates, and the large upper and lower labial plates. Fig. 1*e*, under side of tail, showing the single row of undivided subcaudal plates, the anal plate, and a few of the posterior ventral plates, with the bluish-grey freckled coloring of these parts. Fig. 1*f*, side view of portion of same specimen from the middle of the length, natural size, showing the coloring and bands above and the yellow of the under side. Fig. 1*g*, interior of palate, twice the natural size, showing the two long rows of numerous small solid teeth on the palate; the one large poison-fang on the one side and two on the other, together with the single smaller solid tooth on each side behind the poison fangs at an interval of the width of one labial plate. Fig. 1*h*, side view of termination of tail of same specimen.

Frederick McCoy.

Pl. 4. (Fishes.)

A. Bartholomew, del. & lith. Prof. Mc Coy, direxit. De Gruchy & Leigh, imp.

PLATE 4.

CHRYSOPHRYS AUSTRALIS (GÜNTH.).

THE AUSTRALIAN BREAM.

[Genus CHRYSOPHRYS (Cuv.). (Sub-kingd. Vertebrata. Class Pisces. Order Acanthopterygia. Fam. Sparidæ.)

Gen. Char.—Four or six conical teeth in front edge of the mouth, and three or more rows of rounded, nearly hemispherical, crushing teeth in upper and lower jaws. Cheeks scaly. The dorsal fin with about eleven or twelve spines, fitting into a deep channel along the insertion of their bases. Anal fin, with the three anterior rays spinous, very strong. Scales moderately large. Six branchyostegal rays. Air-bladder usually notched or lobed. Extends from Atlantic coast of America to Europe and Africa, the Indian Ocean and Pacific.]

DESCRIPTION.—*Fin-rays:* dorsal, 11 spinous, fourth longest, and 11 branched, the two last united at base; anal, 3 spinous, first very short, second longest, and 9 branched (two last united at base); ventral, 1 spinous, 5 branched; pectoral, 14; caudal, 18. *Scales:* lateral line, 55 to 58, 5 rows above and 17 below the lateral line; 5 rows of scales on cheek to angle of preoperculum, 6 rows to angle of operculum from edge of preoperculum. *Proportions:* body ovate, compressed; head small, profile arching gradually from origin of dorsals to tip of snout with slight convexity, and tapering from same vertical of greatest depth gradually to the tail; usual length (of specimen from Gippsland), 12½ inches to end of caudal fin; greatest depth at base of fourth dorsal fin-ray, 4½ inches; thickness, 1¾ inches; length of head, 3 inches 1 line; diameter of eye 8 lines (about 4⅔ in length of head); greatest height of dorsal fin, at fourth spine, 1 inch 4 lines, equal to length from anterior edge of orbit to end of snout; length of third spine, 1 inch 3 lines; length of second, 10 lines; of first, 5 lines; length of pectoral fin, 3 inches 11 lines; first anal spine, 3 lines; second longest, equalling the fourth dorsal. *Teeth:* there are 6 large conical teeth projecting in front of the upper jaw, and 6 slightly smaller below; the outer lateral row above and below more conical than the inner rows, which are hemispherical, about 3 rows below and about 4 rows above, the inner and posterior teeth largest below, the third row largest above. *Color:* the scales of the cheeks, back, and sides, are each minutely dotted with black points on a changing ground of beautifully lustrous green and gold bronze, with occasional bright-blue and copper-red reflections fading into purple, the reddish and blue being predominantly on the cheeks, and the purple on the top of the head; the scales of the belly are of a yellowish pearly-white; there are faint longitudinal streaks of purple or gold, darker or brighter according to the light, extending from head to tail through about the middle third of each scale of the longitudinal lateral rows; dorsal fin yellowish behind, the membrane clouded and freckled with purplish, the margin darker, the spines minutely dotted with brown; anal fin yellowish behind, anterior two-thirds purplish-grey clouded with dark; ventral fins, rays yellowish, minutely freckled with darker, membrane nearly colorless; pectoral fin, rays brownish, membrane nearly colorless; caudal fin, yellowish-olive, with a blackish terminal margin; iris of a gold bronze, with a narrow orange line, and freckled with minute black dots.

REFERENCE.—Günther, Cat. Acanthop. Fishes, vol. 1, p. 494.

The "Bream" of colonists is the chief sport of amateur fishermen, who catch great quantities by rod and line in the brackish water of the mouths of the rivers and creeks, and sea entrances to the Gippsland Lakes, which they enter during the summer months, spawning there about November and December. They go down to the sea again about the end of June, when the cold weather comes on, and may be caught in the sea, commonly about the ends of the piers, with rod and line during the winter months. The bait is usually small fish, or small shrimps or worms. The fish is moderately good for the table, except at spawning time, when the flesh becomes flabby, and the colors dull. The weight rarely exceeds 6 lbs., and is usually much less. The largest specimen I have seen, now in the Museum, is $17\frac{1}{2}$ inches long, but differs in nothing from the above described example in proportion, or numbers of fin-rays and scales. It is from the Mordialloc Creek. Young specimens, $4\frac{1}{2}$ inches long, from Hobson's Bay, agree exactly in the number and disposition of the scales and fin-rays with the largest.

The species has not been figured before.

EXPLANATION OF FIGURES.

Plate 4.—Fig. 1, average specimen, natural size. Fig. 1*a*, inner view of upper surface of mouth, showing the rows of rounded crushing teeth on the sides, and 6 pointed teeth in front. Fig. 1*b*, inner view of lower jaws and tongue, showing 6 pointed conical teeth in front, and the rows of rounded crushing teeth on each jaw, with the clusters of minute intervening ones behind the prominent anterior teeth. Fig. 1*c*, form of section of tail. Fig. 1*d*, form of section from below third dorsal ray. Fig. 1*e*, ordinary scale above lateral line, three times larger than nature. Fig. 1*f*, scale of lateral line, three times larger than nature.

FREDERICK McCOY.

A Bartholomew del & lith

Prof M^c Coy direxit

H.G. De Gruchy & Co imp

PLATE 5.

LEPIDOTRIGLA VANESSA (RICH.).

THE SPINY-SIDED BUTTERFLY-GURNARD.

[Genus LEPIDOTRIGLA (GÜNTH.) (Sub-kingd. Vertebrata. Class Pisces. Order Acanthopterygia. Fam. Triglidæ.)

Gen. Char.—Head subrhomboidal, with the top and sides bony, covered with granular ridges; scales of body moderately large (much larger than in *Trigla*); anterior dorsal fin much shorter than posterior dorsal; three long slender pectoral filaments; teeth villiform in numerous rows on both jaws and a few on the vomer, none on the palate bones; air-bladder bilobed in front.]

DESCRIPTION.—*Fin-rays:* dorsals, anterior 10, posterior 17; anal, 15 or 17; ventral, 6; pectoral, 10; caudal, 29. All the rays of the first dorsal and the first four of the second dorsal simple; all the rays of the anal simple except the penultimate one; 3 lower rays of the pectoral simple; first ray of ventrals simple. *Scales:* 5 rows above and 17 to 22 rows below the lateral line, finely serrated at posterior edge; those of lateral line 71, larger than the others and each with one or two large compressed spines; the posterior end of the lateral line branches into two ridges, with about 17 pores on each, running one along the second ray above the middle, and the other along the ray next below the middle. A row of 10 small and about 20 larger spines extends on each side at base from second ray of the first dorsal to the last ray of second dorsal. *Head* with profile concave, snout short, suborbital angles only slightly produced beyond a right angle, with 3 or 4 short spines on each side of the one at the angle, which is half a line long; eye large, diameter two-fifths the depth of the head; head, from snout to tip of opercular spine, one-fourth the total length to upper end of caudal; depth of head vertically under middle of eye equal to length from tip of snout to same vertical line; anterior frontals forming upper anterior quarter of orbits serrated, two of the teeth larger than the others; no spine behind the eye; suprascapular spine, opercular spine, and coracoid spine about 1 line long; space between the orbits very deeply concave, equal to diameter of eye. Third ray of first dorsal longest, five-sixths the depth of body at its base; fifth (or first branched) ray of second dorsal longest, and equal to the fifth ray of first dorsal; pectoral reaching to seventh ray of anal, or second of dorsal; eighth ray of anal longest and equal to seventh of first dorsal. *Colors:* head, back, and upper portion of sides pale dull brick-red, clouded with irregular large darker patches, the darkest of which is on upper base of tail; dorsal fins very pale-brownish, with a reddish tint above; a large rounded blackish spot with an indistinct whitish border extends from the fifth to the seventh ray of the first dorsal, nearer to the upper than the lower ends of the rays; caudal whitish at end margin, red at base, and red rays and purplish membranes at middle; anal and ventral fins opaque whitish or nearly colorless towards the base and pale reddish towards margin; pectoral filaments pinkish-white, slightly chequered with brownish near base; pectoral fins with two or three large black blotches near end of first to third rays on under edge of inner side, the membrane between the rays dull greenish-yellow, with a broad border of intense bright ultramarine blue and numerous irregularly scattered oblong spots of the same color between the rays; outer side of pectorals brownish-pink; chin, throat, and

belly pure white; iris yellow and black, mottled with green. *Teeth:* a small group of 5 small teeth on anterior end of vomer; about 9 longitudinal rows of minute villiform teeth on each side of upper jaw, about 5 rows in lower jaw.

The transverse section of the body shows a deep wide channel along the back, in which the dorsal fins are set, the bounding ridges set with small spines, the sides with a nearly straight slope to the lateral line, which is made prominent by an obtuse angulation, set with the spiny scales, from which the sides and belly are broadly rounded. Plates of the head marked with fine radiating granulated ridges. Opercular spine short. Length, 9 inches 3 lines; depth, 1 inch 7 lines; diameter of eye, 7 lines; length of head, 2 inches 6 lines; pectoral fin, 2 inches 11 lines.

Reference.—Rich. Trans. Zool. Soc., v. 3, t. 5, f. 1.

The comparatively large size of the scales separates the species of *Lepidotrigla* at a glance from the true *Triglæ*, and this character, together with the black blotch on the first dorsal and bright-blue border and spotting of the inner side of the pectorals, easily distinguish the present fish from the other somewhat similar gurnards found in Australian seas. The only specimens I have seen of this beautiful fish were caught in Hobson's Bay in the month of August in different years. It inhabits deep water and feeds on small shells and Crustacea. Like most of the gurnards, it groans or makes a grunting noise when taken out of the water until it dies.

The beautiful coloring of this fish in the fresh state has not been represented before.

Explanation of Figures.

Plate 5.—Fig. 1, side view, eleven-twelfths of the natural size. The pectoral fin in the figure is twisted, to show the beautiful coloring of the inner side, so that the ventral or lower simple rays appear on the upper edge. Fig. 1*a*, head viewed from above, one-twelfth less than the natural size, showing form of anterior end of snout, composed of the spinous ends of the two suborbital bones, and the scapular opercular and preopercular spines. Fig. 1*b*, inside upper view of mouth, showing the small central group of few teeth on anterior end of vomer and the numerous rows of minute villiform teeth on each side of jaw, enlarged one-half more than natural size. Fig. 1*c*, inside view of lower jaw and tongue, showing the fewer rows of teeth on lower jaw, one-half larger than nature. Fig. 1*d*, one of the terminal porous branches of the caudal extension of the lateral line, highly magnified. Fig. 1*e*, scale from lateral line, showing the large median and two smaller vertical pores and the projecting spine, magnified three times larger than nature. Fig. 1*f*, ordinary scale from a little below the lateral line, showing the serration of the posterior margin, three times larger than nature.

Frederick McCoy.

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1a
1b
1c
1d
1e

PLATE 6.

TRIGLA KUMU (LESSON AND GARN.).

THE KUMU GURNARD.

[Genus TRIGLA (ARTEDI). (Sub-kingd. Vertebrata. Class Pisces. Order Acanthopterygia. Fam. Triglidæ.)

Gen. Char.—Head subrhomboidal, with the top and sides bony, covered with granular ridges; scales of body very minute; anterior dorsal fin much shorter than posterior one; three long slender pectoral filaments; teeth villiform in numerous rows on both jaws, and a few on the vomer, none on the palatine bones; air-bladder bilobed in front.]

DESCRIPTION.—*Fin-rays:* dorsals, anterior 9 or 10, posterior 15 or 16; anal, 15 or 16 (last two united at base); ventral, 1 simple and 5 branched rays; pectoral, 10; caudal, about 18 ($11\frac{5}{3}$). *Scales:* along lateral line about 69 to 73, 16 rows above between the dorsals, and about 65 below the lateral line; no spine to scales of lateral line. Snout acutely pointed when viewed sideways; profile nearly straight; concave space between the eyes rather less than diameter of orbit, and only slightly hollowed; vertical diameter of eye about $3\frac{1}{2}$ times in the depth of the head; 2 small spines in front of the eye; 1 suprascapular, 1 opercular, and 2 preopercular spines, small, about 2 lines long; lateral angles of snout, or ends of sub-opercular bones, blunt, nearly rectangular, with small blunt spines, about 5 or 6 in number; a row of 25 spines on each side of the concave channel in which the dorsal fins originate; first dorsal spine little shorter than the second and third, which are longest, and equal to the length from anterior nostril to tip of spine at angle of preoperculum. *Color:* head yellowish on cheeks, purplish-grey above, in front, and behind; back and sides a dull pale cinnamon-brown, with an olive tinge, and with large blotches, irregular in size, shape, and disposition, of a dull indian-red or reddish-brown. Dorsal fins very pale, brownish, and yellowish; anal and ventral fins whitish; 3 pectoral filaments dotted with brown; pectoral fins blackish-green, with reddish rays on outer side; on inner side pale yellowish-olive, with a pale, narrow, greyish-blue margin, with 2 or 3 rows of small oval spots of the same color within the border; a large ovate black blotch between the third and sixth rays from the lower edge, having about five oblong opaque white spots tinged with bluish along its upper edge, and three running down the middle; caudal fin reddish, with brownish rays darker towards the margin; throat and belly pure white. Iris golden yellow. *Teeth:* about 5 rows on upper jaw of 60 each in the length; a transverse arched group of about 35 small teeth on front of vomer; about 4 rows in lower jaw, 50 each in the length. Transverse section of body, with a narrow rounded back, widening towards the belly. Total length to end of caudal, 19 inches; length of head, 4 inches 6 lines; second spine of dorsal, 2 inches $6\frac{1}{2}$ lines; length of pectoral, 5 inches (reaching to third ray of anal and second dorsal); diameter of eye, 9 lines; space between eyes, $9\frac{1}{2}$ lines.

REFERENCE.—Lesson and Garn. Voyage de la Coquille. Poissons, t. 19.

This is a well-known species, occurring in great quantities in the summer months in New Zealand waters, under the name of "Kumukumu," and occasionally visits Hobson's Bay, usually in August. The very small scales, brownish-olive body, and peculiar coloring of inner side of pectoral, render it easy of recognition.

Explanation of Figures.

Plate 6.—Fig. 1, side view, seven-twelfths of the natural size. The pectoral fin in this figure has the upper edge twisted outwards and downwards, so as to display the inner characteristically colored side. Fig. 1*a*, head viewed from the top to show the form of the snout, with the small spines at the end of the suborbital bones, and the small spines in front of the orbit, seven-twelfths of the natural size. Fig. 1*b*, inner view of tongue and lower jaw, showing the tongue and few rows of small villiform teeth on the jaws, natural size. Fig. 1*c*, form of section of body in front of first dorsal ray, seven-twelfths of natural size. Fig. 1*d*, inside view of upper jaw, showing the arched median group of small teeth on the anterior end of the vomer, and the numerous rows of minute villiform teeth on each side of the jaws, natural size. Fig. 1*e*, scale from below the lateral line, five times larger than nature. Fig. 1*f*, another scale from more anterior part of the body.

Frederick McCoy.

1b
1d
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1a
1e
1
1

PLATE 7.

MEGASCOLIDES AUSTRALIS (McCOY).

THE GIANT EARTH-WORM.

[Genus MEGASCOLIDES (McCOY). (Sub-kingd. Articulata. Class Annelida. Order Abranchiata. Section Terricola. Fam. Lumbricidæ.)

Gen. Char.—Body very large, cylindrical, of from 300 to 500 rings, the anterior portion from a little behind the mouth thickest, suddenly narrowing at genital rings, then for some feet a little wider and again dilating slightly at the tail; the prominent middle third of each ring set with 8 very minute spinules arranged in four pairs on the abdominal and lateral two-thirds of each ring, leaving rather less than one-third of the dorsal surface smooth, and forming 8 longitudinal lines along the body from the genital rings. A row of spiracular pores along the mid-line of the back opening on the anterior edge of each of the rings except near the head in front of clitellæ. An imperfect genital, hard, cingulum or clitellæ extending only over the ventral third of about three rings towards anterior tenth of the length; rings near posterior end much narrower and less distinctly marked than at the anterior end.]

DESCRIPTION.—Body of about 350 to 500 rings (about 10 in 1 inch of anterior end when extended, or 14 in same space when contracted, about 16 in same space at middle of body), tapering to each end when extended, but both anterior and posterior ends becoming club-shaped when contracted; a marked narrowing of the body between the 36th and 40th rings behind the clitellæ; anterior end, of about the first 25 to 40 rings, sooty brownish-black, lighter on the ventral fourth of the surface, rest of body, back, belly, and sides alike in color and of a light, brownish flesh-color with a slight purplish-grey reflection; oral and anal apertures central. Between the 32nd, 33rd, and 34th rings from the mouth, on the ventral side, are three genital short bands, less than the rings in thickness and only extending round about one-fourth of the circumference of the body, forming an imperfect cingulum or clitellæ much tougher in consistence and lighter in color than the other parts. About 2 feet long when contracted and about 6 feet long when extended; 8 lines to $\frac{3}{4}$ of an inch in diameter. Spinets or setæ $\frac{1}{36}$th of an inch long and $\frac{1}{500}$th of an inch wide with the exterior pointed end very slightly hooked, general form slender, nearly straight, with a very slight sigmoid curve, subtruncate obliquely at base (more slender and less curved than Vaillant's figure of the setæ of *Perichæta cingulata*, Ann. des Sc. Nat. v. 10, pl. 10, f. 2, or Schmarda's figures of those of the four other species, and nearly agreeing with Baird's figure of *Megascolex* (*Perichæta*) *diffringens*, but rather more slender); each seta projecting from the end of each of 8 minute conical papillæ, the base arising from the prominent middle ridge of each ring, and the apices directed outwards and backwards; the 8 setæ, on successive rings, form 8 longitudinal lines, beginning from the 25th to the 32nd ring, to end of the body, arranged in four pairs, the outer pairs on each side about the length of a contracted ring apart, the ventral pair a little farther apart, and the pairs of rows about twice as far apart as the two rows of the pair; one-third of each ring forms a smooth space along the back of the animal, down the centre of which the breathing spiracles form a conspicuous line of transversely oval pores beginning about the 40th ring, and becoming indistinct before quite reaching the posterior end; the dorsal portion of the rings flatter than the rest and without the longitudinal muscular plicæ or wrinkles on the margins of the ventral and lateral thirds. The mouth is a transverse slit when closed $\frac{1}{4}$ of an inch wide; but when partially open the upper edge has a hard, thickened,

arched margin, closed below by a soft tubular sort of under lip, looking like a portion of the œsophagus everted; the head ring radiatingly granulated outside the opening. The first 30 rings are broader than the others, but each is divided into three by two impressed lines parallel to the margins, making it difficult to count them.

Dr. Templeton, of the Royal Artillery, was the first to draw attention to the existence of enormous earth-worms, 20 to 40 inches in length, and 1 or $1\frac{1}{2}$ inches in thickness, in the alpine region of Ceylon during the rainy season, in a letter sent to the Zoological Society of London, and published in their proceedings of 1845,* for which he proposed the name *Megascolex cæruleus*, from their size and color. They had 270 rings, and the genitalia occupied the 16th, 17th, and 18th rings, after which the diameter was less, and from the 15th ring a row of breathing pores extended along the middle of the back; and 100 setæ on each ring except on mid-line of back.

Schmarda next, in the second part of his admirable work "Neue Wirbellose Thiere," founded the genus *Perichæta* on the character "Setæ totam segmentorum circumferentiam in forma annuli cingentes," and remarks—"Das Geschlecht *Megascolex* wurde von Templeton aufgestellt. Es charachterisirt sich dadurch, dass die Borsten auf dem Rücken in Querreihen in der Mitte der Leibesringe stehen." Now Templeton, on the contrary, states distinctly that in his *Megascolex* there are no setæ on the mid-line of the back at all, but they form a row round the other parts of each ring. Dr. Baird next described† somewhat similar creatures of smaller size, from the earth imported with orchids into some hothouses in Wales (probably from India or South Africa), which he named *Megascolex (Perichæta) diffringens* from the great brittleness of the individuals, and supposing *Megascolex* and *Perichæta* to be synonymous genera. These living specimens were described to him by the gardeners to have different habits from earth-worms, twisting violently about like eels when held (the popular name eel-worm was given to them by Mr. Fish), and travelling by night with great swiftness over the surface of the ground, into which they vanish

* Annals and Magazine of Natural History, vol. xv., p. 59.
† Proc. Zool. Soc. Lond., 1869, p. 40.

with astonishing rapidity when disturbed. Neither Dr. Baird nor other subsequent writers can be justified in uniting the genera *Megascolex* and *Perichæta*, if Schmarda be correct in stating that in his genus the setæ go quite round the body, and in his *P. leucocycla* from Ceylon he even says—"Die Rückenborsten sind etwas stärker als die der Bauchseite." Schmarda is fully borne out in this by Dr. Grube in his description and figure of *Perichæta Tahitensis*, from Tahiti, in his essay on the "Anneliden" in the "Reise der Österreichischen Freggate Novara." Under any circumstances it is clear that our Australian species approaches more nearly to Templeton's genus, and cannot belong to *Perichæta*, which seems distinct from *Megascolex* by its smaller size, much fewer body rings, and fewer and much larger setigerous papillæ. Still, as Templeton says, his *Megascolex* has 100 setigerous papillæ on each ring, while ours has only eight, disposed in four pairs as in *Lumbricus*, I am constrained to use a special generic title *Megascolides* for the present form, and make it the type of a distinct genus, which only differs as far as I know now from *Lumbricus* in its great size, very much more numerous rings, and the clitellæ formed of three separate short bands, not going round the body, but being confined to the ventral side.

The setæ are extremely difficult to see and count, on most specimens, from their extreme minuteness ; a slight brown speck showing under a lens on the lighter flesh-color skin the places of insertion of the setæ and position of the rows in which, after great trouble, I have satisfied myself the setæ are alone developed, is a great help in counting them. But, as I find on most of the rings several other exactly similar brown specks, 15 to 18 on the mid-ridge of each ring, those of one ring alternating irregularly with those of the adjoining rings between the true setigerous ones, forming the four pairs of longitudinal rows, but not really containing setæ, I have a strong impression that these may have been counted as setæ also by Templeton in his *Megascolex*, and it is not impossible that the longitudinal muscular plication (which also is absent on the back) may have been confounded with the slight papillary swellings from which the setæ arise. Furthermore, Dr. Baird, observing that all Schmarda's worms from the same locality as

Templeton's agreed with the introduced one he had examined, in having very numerous distinct papillæ, each with a seta, on each ring, concluded that the *Megascolex* and *Perichæta* were identical, but in the same localities in Victoria in which the present Giant Earth-worm occurs, I also find a true *Perichæta* (*P. Gippslandica*) (McCoy) in abundance, of the much smaller size, fewer rings, and with very numerous large papillæ and setæ going entirely round the rings (visible to the naked eye) of the described species of true *Perichæta.*

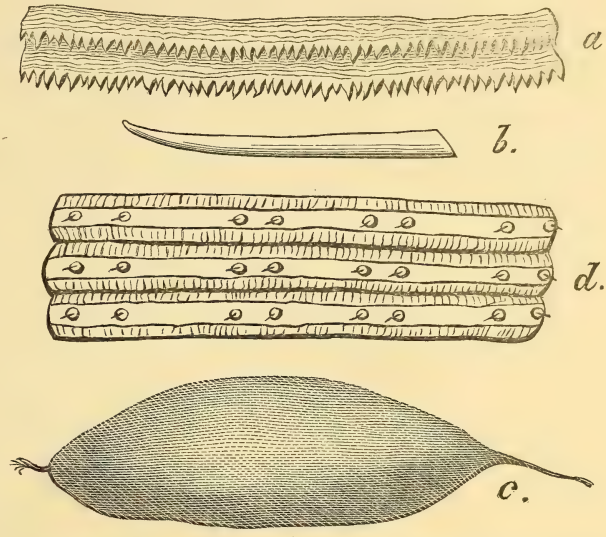
On the first entry of the surveyors into that paradise of land selectors, the Brandy Creek district, on the new Gippsland line of railway, I received from them numerous specimens of this gigantic Earth-worm, with queries as to whether it were a snake or a worm, &c. All of them, from the great diameter of the digestive tube, were almost like small membranous sausage-skins filled with earth, and from their great brittleness each individual was usually received divided into several pieces, the broken ends of which contracted so strongly as almost to close the wound, and decomposition setting in so rapidly that very little of the essential characters could be made out. Although I have more recently examined numerous perfect examples, both living and in spirit, I cannot find any male or female genital pores, such as are so conspicuous in *Perichæta*, the former between some rings on the ventral surface in front of the "cingulum," and the latter behind it.

The living worms emit an odor resembling that of creosote. Like the ordinary earth-worms they burrow in the earth, swallowing the portion in front as they bore downwards, casting the portions from which they have abstracted the nutrient particles on the surface of the ground, renewing the surface by a kind of natural trenching which tends to bury the surface beneath a continual top-dressing of fresh soil from below.

I have recently received from Mr. Search several examples from Queensferry of the oval, tough, horny case or capsule, 2 to 3 inches in length, half an inch wide, and terminated by a bunch of filaments at one end, and a shorter pointed extension at the other, in which the young worm of this species is enclosed, nearly agreeing with that of the common earth-worm of Europe, except

in size. These capsules are greenish and translucent when fresh, but soon become dark-brown and hard in spirit.

A specimen of the thickness of that in the plate will stretch itself along the ground to a length of 6 feet in its exertions to escape, and one of that thickness held up measured 5 feet 10 inches. As has been observed of the *Perichæta*, the two ends remain alive and vigorous in movement long after some inches or feet of the middle may be dead and decomposed, differing in this respect from *Lumbricus*. The settlers remark that fowls will not eat these worms, even when chopped up. When cut they bleed freely an abundance of the bright red blood which distinguishes the *Annelida* so curiously from the lower and higher classes of the invertebrate animals.



a Two rings of dried specimen magnified, showing the irregular conical spinose appearance of the muscular longitudinal bands on ventral and side portions.

b One of the spinules or setæ highly magnified.

d Three rings of body, magnified, showing the eight spinules on the middle ridge of each, the longitudinal muscular plication on the margins, and the disposition of the setæ to form on the successive rings, the four pairs of longitudinal rows.

c Capsule containing the young worm, natural size.

Explanation of Figures.

Plate 7.—Fig. 1, average specimen, natural size, the anterior rings extended, the line of pores being the breathing spiracles (these should not appear on the anterior dark-colored rings in front of the clitellæ). Fig. 1*a*, head of same specimen, contracted; close to the number and letter the three clitellar thickenings may be seen; natural size. Fig. 1*b*, anterior end view, showing the mouth, magnified to twice the natural size. Fig. 1*c*, anal termination, magnified twice the natural size. Fig. 1*d*, the three clitellar swellings when extended, natural size (the three slight depressions often seen in each are too strongly marked. Fig. 1*e*, same when contracted (the pit-like marks too distinct). Fig. 1*f*, dorsal view of smooth space along the back, with the median rows of transversely oval breathing pores on the anterior edge of the rings.

Frederick McCoy.

Pl. 8 (Insects)

A. Bartholomew, del et lith. Prof. McCoy, dirext. H.G. DeGruchy & Co. Imp.

PLATE 8, FIGS. 1, 2, 3, 4.

AGARISTA LEWINI (WALK.).

LEWIN'S DAY-MOTH.

[Genus AGARISTA (LEACH). (Sub-kingd. Articulata. Class Insecta. Order Lepidoptera. Section Heterocera. Fam. Uraniidæ.)

[*Gen. Char.*—Body moderately long and thick. Palpi long, first and second joints depressed, hairy, third joint long, slender, cylindrical, conical at apex, nearly smooth. Antennæ rather shorter than the body, slightly swollen towards the distal end, apex slender pointed, arched outwards.]

DESCRIPTION.—Brownish-black with a slight purple reflection. *Upper side:* anterior wings darkest, three small spots at the base, and four or rarely five larger transversely oblong ones between base and the large curved transverse band, a little beyond the middle, and which reaches two-thirds of the way from the front edge to the abdominal one, of a rich straw-yellow (paler in the male) ; a row of eight small ovate spots parallel to the margin, a row of seven still smaller about as far within the outer row as it is within the margin, and a short marginal band at the apex of a yellowish-white ; posterior wings rich blackish-brown with a slightly marked small yellowish spot nearly in the middle in the male (often absent), large and distinct in the female ; a short marginal pale-yellow band at apex and row of indistinct yellowish-white spots on edge of male, larger in female. *Under side:* anterior wings rich brownish-black with only the marginal apical small band, the central transverse band, and one spot between it and the base, distinctly marked, of the pale-yellow color ; one or two dots at base and a few of the intra-marginal row of dots very slightly indicated, of a yellowish-white. Posterior wings blackish-brown, with the short marginal band at the apex as on upper side, but a very distinct transverse arched yellow band near the middle, extending about half the breadth of the wing from near anterior towards abdominal margin, five or six small dots on the margin, and a concentric row of six or seven smaller ones between it and the medial band, yellowish-white ; all these marks larger on the female. Body blackish-brown, with a few small spots on head and thorax and a conspicuous one on each side of posterior edge of each abdominal segment, pale whitish-yellow ; apex of abdomen, edge of penultimate segment, thighs, and under edges of abdomen, tawny-buff. Legs and antennæ black, the former ringed with whitish-yellow. Length of body, 9 lines in male, 10 lines in female ; width from tip to tip of wings, 1 inch 7 lines in male, 1 inch 11 lines in female.

REFERENCE.—Boisduval. Voy. de l'Astrolabe, p. 176.

This species is figured to complete the plate illustrating the curious genus *Agarista* so characteristic of the Southern hemisphere,

one species of which is so injurious to the imported vines. This species is larger, with broader wings, and much less distinct spots than the *A. Ephyra* of Tasmania, in which the middle spot on upper surface of the posterior wings is always large and distinct. It is not uncommon near Melbourne, the larva feeding on the *Epilobium tetragonum*, which is an abundant weed. The larva is about 17 lines long, and $2\frac{1}{2}$ lines in diameter, of a rich creamy-white color, with numerous small spots of different sizes and transverse lines, irregular in length and undulation, of jet-black ; the head, a patch on the neck, and one on the last and antepenultimate segments, buff ; the surface with long slender scattered hairs. The pupa is 9 lines long, enclosed in a slight oval cocoon, formed under the surface of the ground, about 11 lines long and 4 lines in diameter, composed of little grains of earth lined with silk. The larva figured assumed the pupa state on the 18th February, and the imago, or perfect moth, emerged on the 7th March following.

The *Agaristæ* constitute one of those anomalous groups having the day-flying habits of the Butterflies, but the antennæ, instead of terminating in a club, as is always the case with them, are terminated in slender points as in the Moths, with a slight swelling in the middle as in the twilight-flying Hawk-moths or Sphinxes. Their transformation and earthy cocoons here figured show their true relations with the night-flying Moths as well as the habit of resting with the wings horizontal (not erect as in Butterflies). The impression given by Lewin, that the cocoon is a thin silky one attached to twigs of trees, is certainly due to some mistake, and the relationship to *Urania* is thus shown to be so remote, that it would be better to separate *Agarista* as a peculiar family, *Agaristidæ*.

EXPLANATION OF FIGURES.

Plate 8.—Fig. 1, upper surface, natural size, of body and wings on right hand of figure ; the detached wings on left of figure show the markings of the under side. Fig. 2, larva full grown, natural size, on its common food, the *Epilobium tetragonum*. Fig. 2*a*, anterior portion of larva, magnified. Fig. 2*b*, posterior portion of larva, magnified. Fig. 3, pupa, natural size. Fig. 4, cocoon, natural size.

PLATE 8, FIGS. 5, 6, 7, 8.

AGARISTA CASUARINÆ (SCOTT).

THE LORANTHUS DAY-MOTH.

DESCRIPTION.—Jet-black with a slight brownish tinge. *Male—Upper side:* anterior wings with four irregular transverse bands (with a very slight subdiscoidal spot between the second and third), and a narrower one nearer the outer margin, extending from the anterior to the abdominal edge, undulated so as to form two salient angles towards the outer margin, with semicircular curve towards the base between them, all of a clear sulphur-yellow; outside the undulated band are seven or eight narrow, clear white, radiating streaks on the nerves; the margin with a narrow interrupted white edge. Posterior wings with a continuation of the sulphur-yellow undulated band crossing rather nearer the margin than the base, with one distinct angular inflection towards middle of the margin, wider and slightly undulating thence to the abdominal margin; within this band is a triangular median sulphur-yellow spot, and two very faint-greyish ones a little nearer the base; margin with a narrow interrupted pure white edge. *Under side:* anterior wing having the spotted white edge, the white radiating neural lines, the sulphur-colored undulated band, the next short transverse band, and the large submedian band as in the upper surface, but within this there is only one triangular spot, and there is a yellow band on the anterior margin from base to upper end of median transverse band; posterior wings with white interrupted margin as on upper surface, but with about five slender white radiating streaks on the veins between it and the undulating sulphur-yellow band, which agrees with upper surface, the next triangular spot being extended into a band constricted in the middle, the upper end of which is continuous with a broad marginal band extending to the base; within this are two large yellow patches appearing only as small faint spots on upper side. Head, body, and thorax black, two narrow pale-yellow lines on upper side of head, and three on the thorax; tip of abdomen and thighs bright rufous; legs black, the joints edged with white. Length of body, 1 inch; width from tip to tip, 2 inches 5 lines. *Female* larger, but almost identical with the male in coloring. Length of body, 1 inch; width from tip to tip, 2 inches 6 lines. The *larva* is about 2 inches long and 3 lines in diameter, of a jet-black with numerous unequal, irregular transverse creamy-white lines, irregularly set with long slender white hairs; the head and upper part of next segment rusty-buff, the penultimate segment at posterior end cinnabar-red. Pupa 11 lines long, nearly destitute of any cocoon covering, under the surface of the earth near roots of trees.

REFERENCE.—Scott, Lepid. Ins. N. S. Wales, t. 8.

This is the largest and finest species of the genus in Victoria, and perfectly harmless. The species is named *Casuarinæ* by Mr. Scott, but in Victoria it never feeds on the *Casuarina* but always on the *Loranthus*, or so-called Native Mistletoe, which is parasitic

on the Gum Trees (*Eucalyptus*), on which I have figured it. It is comparatively rare about Melbourne.

EXPLANATION OF FIGURES.

Plate 8.—Fig. 5, male, natural size, the left hand-disconnected pair of wings showing the coloring of the under side. Fig. 6, female, natural size, the left disconnected pair of wings showing the under side. Fig. 7, larva, natural size, on the natural food, the *Loranthus*. Fig. 8, pupa, natural size.

PLATE 8, FIGS. 9 TO 13.

AGARISTA GLYCINE (LEWIN SP.).

THE VINE DAY-MOTH.

DESCRIPTION.—Rich brownish-black, with a slight purplish reflection. *Male*—*Upper side:* anterior wings, with three or four narrow obliquely transverse angulated pale greyish-yellow lines; one broader short subtriangular or oblong spot between them and the broad transverse discoidal band, which is strongly undulated or angularly indented at the sides, both of a sulphur-yellow color; beyond the band are seven or eight radiating narrow yellowish-white lines coinciding with the veins; a small narrow short marginal band of pale-yellow at apex; posterior wings with distinct yellow spot near middle, and a narrow pale-yellow edge to the margin. *Under side:* anterior wings, with the narrow transverse basal lines obsolete, but the yellow trigonal spot and transverse band larger than on the upper side, the whitish radiating neural striæ less distinct than on upper side; posterior wings, with a broad lunate yellow band in middle, the upper end curving along the anterior margin to the base, the edge margined with pale-yellow; between the disc band and the margin a concentric row of seven or eight slightly-connected small pale-yellow spots. Head, body, and thorax black, with five narrow longitudinal pale greyish-yellow lines on the thorax, and two on the head; posterior end of abdomen rich rusty-buff, as well as the upper edge of penultimate segment and under edges of other segments and the thighs; feet black, ringed with white; length of body, $8\frac{1}{2}$ lines; width from tip to tip, 2 inches. *Female* larger and with broader wings than the male, but identical in coloring of upper and lower surfaces with the male, except that there is no yellow spot in middle of upper surface of posterior wings; length of body, 10 lines; width from tip to tip, 2 inches 2 lines.

Larva about 2 inches in length and $2\frac{1}{2}$ lines in diameter, of a greenish-yellow color, closely marked with very numerous transverse interrupted and irregularly undulated lines and polygonal spots of jet-black, with numerous scattered long slender white hairs; the head and next segment fulvous-brown, spotted with black; the antepenultimate segment with a row across the back of four large quadrate carmine red spots. *Pupa* about 11 lines long and 3 lines in diameter. Enclosed in an oval *cocoon*, formed of particles of earth outside lined with silk inside; the whole so light that the pupa can be seen through it. About 1 inch 3 lines long, and 6 lines wide.

REFERENCE.—Phalænoides glycine. Lewin Lepidop. Ins. N. S. Wales, t. 1. Agarista id., Boisduval Voy. de l'Astrolabe, p. 175.

This species received its specific name from Lewin observing that in New South Wales the larvæ fed on the leaves of the leguminose plant, the *Glycine bimaculata.* In this colony, however, it is generally called the Vine-moth, from one of the most extraordinary changes of habit ever recorded in any insect. In the early days of this colony, before the introduction of the vine, the larvæ of this insect fed on the *Gnaphalium luteoalbum*, which is a very common weed, but since the planting of vineyards the *Agarista glycine* has increased enormously in numbers, and *has totally abandoned its original food to devour the leaves of the grape vine*, never now touching the former, but thriving and multiplying beyond measure on the foliage of so totally dissimilar a plant, that if the perfect female Day-moth be guided by ordinary instinct to choose that plant on which to deposit its eggs on which the larvæ might find suitable foliage for food (the perfect insect not only being deprived of jaws fit for eating leaves itself, but being separated from the foliage-eating larval stage of its existence by the intervening pupa stage, in which feeding, motion, and the senses are all stopped), it is not possible to conceive or understand how the egg-laying Day-moth could have gained such knowledge of the properties of the Vine as would induce it to abandon the natural food (not of itself, but) of its larvæ, and to put its trust in a foreign plant of which one might suppose it could know nothing.

There are two or three broods in the year, the first brood of larvæ appearing about the end of October, or when the vines begin to come into leaf, and after a few weeks enter the pupa state, about beginning of December, the moth coming out about the end of December, while the larvæ figured descended into the earth, formed their earthen cocoons beneath the surface at the end of March, and the perfect imago came out on the 18th of May.

I cannot understand Lewin's statement and figure of a light cocoon of thin silk attached to twigs of trees for this species, for in this colony it invariably forms a slight cocoon of earth below the surface of the ground.

The injury done to the vines in the extensive vineyards of Victoria by the larvæ of this species is enormous, and seems to be increasing. Their numbers are altogether too great to be dealt

with by any other means but hand-picking, and there are not hands enough in the country yet for that, as the children by law must attend school. The Acclimatisation Society acclimatised the Indian Minah in the hope that, besides destroying the Grasshoppers and Locusts (which they do admirably), they might diminish this pest also; but they have unfortunately developed a taste for eating the grapes, and do not seem to like the larvæ of the *Agarista*. Before the new school law, children used to be employed thinning the numbers of the larvæ in an unpleasant but effective manner, by cutting each one across with a pair of scissors as they walked along the rows of plants, instead of delaying to pick them off. Even this sharp and decisive proceeding is too tedious to keep down their numbers, and, to add to the difficulty, the fowls even will not eat them, nor any other creature as far as I know. The only suggestion I can make is to employ hand-pickers at the time of the approach of the first brood of caterpillars, when the vines come first into leaf. Each one killed then prevents the formation of multitudes, as well as gives strength to the plant by their present removal. The next object of attention should be to kill all the moths of the first brood found on the wing, the figure here given rendering the right one easy of recognition, and this for each one killed will destroy myriads of eggs which would form the second brood.

EXPLANATION OF FIGURES.

Plate 8.—Fig. 9, male, natural size; the right pair of wings attached to the body represent the upper surface, the left-hand pair (separated from the thorax) represent the markings of the under surface. Fig. 10, female, natural size, the right-hand attached pair of wings showing the upper side, the left-hand detached ones showing the under side. Fig. 11, larvæ, natural size, on their newly adopted food, the vine-leaf. Fig. 11*a*, head and anterior segments, magnified. Fig. 11*b*, posterior end, magnified. Fig. 12, the pupa, natural size. Fig. 13, the earthy cocoon.

N.B.—In some impressions of this plate the black is too pale.

FREDERICK McCOY.

Drawn by A Bartholomew
T Schonfeld Lith

Prof Mc Coy direx.

J M Ferguson Imp

PLATE 9.

PIERIS (THYCA) HARPALYCE (DON.).

[Genus PIERIS (BOISD.). (Sub-kingd. Articulata. Class Insecta. Order Lepidoptera. Section Rhopalocera. Fam. Pieridæ.)

Gen. Char.—*Larva* cylindrical, moderately elongated, tapering towards both ends, covered with scattered small hairs, slightly granular. Head small, rounded. *Pupa* angulated, slightly compressed, sometimes tuberculated, terminating anteriorly in a slender projection; attached by the tail and a transverse silk line at various inclinations from horizontal to nearly vertical. *Imago:* Head small, hairy, eyes moderate. Palpi rather longer than the head, slightly compressed, clothed with long stiff hairs, the last joint slender, scaly, about as long as the second. Antennæ of moderate length with an obconic club usually compressed. Thorax moderate, clothed with long hairs. Anterior wings subtriangular; subcostal nerves from 2 to 4 branched, upper discoidal nerve united to the subcostal for some distance beyond the cell. Posterior wings obovate, discoidal nerve forming a third median nerve, inner margin forming a very distinct channel for the reception of the abdomen. Legs moderate; claws deeply bifid. Paronychia shorter, broad, subtriangular; pulvillus as long as the claws, jointed. Abdomen rather slender, shorter than the posterior wings.

Sub-genus *Thyca* (Wallengren). Only one subcostal nerve given off before the end of the cell, the first being absent. *Larvæ* with moderately long scattered hairs. *Pupæ* very spinous along the ventral surface.]

DESCRIPTION.—*Female*:—Width of wings from 2 inches 7 lines to 3 inches 2 lines. Wings of a greyish-white, with a slight greenish or yellow tinge, having a black border, varying very much in width, broadest at the angles of the upper wing, with 4 to 6 whitish spots of a lighter color than the centre of the wing between the nervures, the corresponding spots on the under side being of a fine king's or gamboge yellow, usually 6 in number; the ground color of the under wing is of a dark-grey with the black margin sometimes reaching considerably within the discoid cell, the tip of which is then marked with a light spot, the color of the middle, or a black spot is seen inside the discoid cell when the black margin does not reach it; the base is black; hinder wings rounded, having a broad black margin and yellowish-grey base on the upper side, on the lower side having a row of 6 or 7 large black spots round the margin, with 6 or 7 large bright vermilion red spots forming a sinuous row, separated from the black margin by a narrow light-greyish interval which is continued along the nerves so as to separate the black margin into spots; this same light-grey forms a large spot at the end of the discoid cell between which and the red band is a large black spot, a black band about as large as the red one being in contact with it on the other parts of its basal edge; on the basal margin of this black band is another greyish band leaving the base intensely black except near the anterior margin, which is marked by a large vermilion spot; thorax and abdomen greyish above, yellow below; legs and feet black. *Male* generally smaller than the female, from 2 inches 8 lines to 3 inches 1 line wide; upper surface much purer white than in the female, with much narrower black margin and smaller white spots in the black near the tip usually 4 or 5 in number, the under side agreeing nearly in color with the female except that the abdomen is whiter.

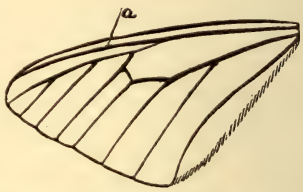
Larvæ nearly smooth, thick, cylindrical, with small head of a dark-brown color, with thinly scattered, rather short white hairs.

Pupa about 1 inch 2 lines long, of a brownish-black glossy surface, carinated along the ventral aspect, without spines on the thorax, with the six anterior segments of the abdomen forming spines slightly arched forwards, with usually a

group of three similar ones on each side of the base of the abdomen; anterior point of the head produced into a slender stem in front of base of antennæ, about 1 line long, terminating in a bifid fork arched downwards; the pupæ are fixed in groups of about 40 or 50, closely packed communities attached to a sheet of white silk web often 1 foot or more in length and 6 or 8 inches wide, binding together several of the terminal twigs of the *Casuarina* or she-oak tree which they frequent, each individual being fastened by the tail and a thread across the anterior part of the abdomen at various inclinations from the horizontal to vertical with the head up.

REFERENCE.—*Papilio Harpalyce* (Don.), Epit. Ins. N. Hol., t. 18; *Pieris, id.* (Boisd.), Sp. Gen. Lep., p. 458.

The family *Pieridæ*, including the majority of "white" butterflies, like the family *Papilionidæ*, has the six legs perfectly developed, but the former differs from the latter in wanting the spines on the anterior tibiæ. The sub-genus *Thyca*, to which the present beautiful species of the old genus *Pieris* belongs, is readily distinguished from the other divisions of the genus by having only one subcostal nerve, marked *a* in the woodcut, given off before the end of the discoid cell. It is a remarkable circumstance that Doubleday and Westwood state that none of the pupæ of the family *Pieridæ* are ever bifid in front, while the present species and the *T. Aganippe* figured on our next plate have the anterior process most distinctly forked and arched downwards. There are two broods of this species in the year, one appearing towards the end of August and the other towards the end of February, remaining about sixteen days in the pupa state; the larvæ are found on the weeping species of *Casuarina* and feed on the parasitic *Loranthus* found growing upon it.



Neuration of anterior wing of P. T. Harpalyce; the letter *a* marking the characteristic single subcostal nerve.

The present species is remarkable for the extraordinary habit of spinning a large white silken sheet like a tough cobweb on which to attach the pupæ in large groups of very numerous individuals closely placed side by side.

As Mr. Wallace has noted that certain islands north of Australia have the individuals of the species of white butterflies distinguished from the individuals of the same species found in other islands by the greater or less angularity or acute pointing of the tip of the upper wing, it is interesting to note that in this species, although

the upper wings of the male are more angulated or less rounded than in the female, yet the amount of straightening of the outer edge and consequent angularity varies in different individuals of the same brood.

Common everywhere in Victoria, flying at moderate heights about the she-oak trees (*Casuarina*), and occasionally visiting gardens.

Explanation of Figures.

Plate 9.—Fig. 1, male (rather large specimen), natural size, upper surface. Fig. 2, female, natural size. Fig. 2*a*, under surface of same specimen. Fig. 3, larva slightly thickened, about to assume the pupa condition, natural size. Fig. 4, sheet of silk web with group of pupæ from which the insects have emerged, natural size. (The natural position of this is got by turning the left side of the plate upwards so that the pupæ are nearly horizontal with the head a little higher than the tail.)

Frederick McCoy.

Drawn by A Bartholomew
F Schonfeld Lith.

Prof. M.Coy Direct

J.M.Ferguson Imp.

Plate 10.

PIERIS (THYCA) AGANIPPE (Don. sp.).

[Genus PIERIS (Boisd.). (Sub-kingd. Articulata. Class Insecta. Order Lepidoptera. Section Rhopalocera. Fam. Pieridæ.)

Gen. Char.—*Larva* cylindrical, moderately elongated, tapering towards both ends, covered with scattered small hairs, slightly granular. Head small, rounded. *Pupa* angulated, slightly compressed, sometimes tuberculated, terminating anteriorly in a slender projection; attached by the tail and a transverse silk line at various inclinations from horizontal to nearly vertical. *Imago:* Head small, hairy, eyes moderate. Palpi rather longer than the head, slightly compressed, clothed with long stiff hairs; the last joint slender, scaly, about as long as the second. Antennæ of moderate length, with an obconic club usually compressed. Thorax moderate, clothed with long hairs. Anterior wings subtriangular; subcostal nerves from 2 to 4, branched, upper discoidal nerve united to the subcostal for some distance beyond the cell. Posterior wings obovate, discoidal nerve forming a third median nerve, inner margin forming a very distinct channel for the reception of the abdomen. Legs moderate; claws deeply bifid. Paronychia shorter, broad, subtriangular; pulvillus as long as the claws, jointed. Abdomen rather slender, shorter than the posterior wings.

Sub-genus *Thyca* (Wallengren). Only one subcostal nerve given off before the end of the cell, the first being absent. *Larvæ* with moderately long scattered hairs. *Pupæ* very spinous along the ventral surface.]

Description.—*Male:*—Anterior wings: above bluish-white, with a black moderately wide border, reaching the posterior margin, and divided by a series of about seven or eight irregularly ovate bluish-white spots; anterior edge black; a black spot near distal end of discoidal cell, having a large bluish-white spot within it, separated by about its own diameter from the black of the border; under side nearly like the upper, but two or three of the spots near the tip are rich dark-yellow, and the white near costal margin is tinged with yellow, and there is a black spot near the middle of the inner margin, not seen on the upper surface. Posterior wings: above bluish-white, with a moderately wide black border ending in a point a little beyond the angle; about six large white marginal spots, the anterior three of which only are surrounded with the black at their inner edge; under side black, with a row of six or seven ovate white spots round the margin, each with a dash of pale reddish; a broad irregularly interrupted yellowish-white band in the middle, and a spot of vermilion-red at the base; thorax and abdomen greyish-white; a spot of rich yellow near middle of anterior margin, a larger patch along the ventral margin, and two or three small ones near middle of wings of same rich dark-yellow; width from tip to tip about $2\frac{1}{2}$ inches; margin $\frac{1}{8}$ of an inch more or less.

Female:—Anterior wings: above pale yellowish-white, with the black border much wider than in the male, with the discoidal spot much larger and confluent with the black of the border below, and the enclosed white spots larger; one rounded black spot near middle of posterior or abdominal margin, and a narrow oblong one between it and the discoid spot; under side like the upper, but the three spots near the apex rich yellow and the white near the anterior margin tinged with yellow. Posterior wings: above yellowish-white, marked as in the male, but the black border wider and the spots larger and tinged with reddish at the outer part, leaving the inner crescentic edge conspicuously whiter; under side nearly as in the male, but a spot of vermilion red at base, an oval vermilion spot on outer part of each marginal spot leaving the crescentic white inner edge of each spot very conspicuous; a spot near middle of anterior margin, three small ones near the middle of wing, and a larger patch along the abdominal edge, rich yellow. Body as in male in color; width from tip to tip, about $2\frac{3}{4}$ to $3\frac{1}{4}$ inches.

Larva, about $1\frac{1}{2}$ inches long, of a dark chocolate-brown, dotted with white and set with long white hairs. The specimen figured went into pupa state on the 22nd of January.

Pupa, about $\frac{9}{10}$ of an inch long, dark-brown, mottled with white; attached by the tail to stems of *Loranthus* leaves, with the head maintained in an upward position by an oblique silk thread girding the thorax and fixed to the twig. The imago emerged from the pupa figured, on the 15th February.

REFERENCE.—Don. Epit. Ins. N. Holl. t. 30.

The larvæ of this species feed on the leaves of the *Loranthus*, or Native Mistletoe as it is called, which clings parasitically to the lofty branches of the so-called Gum Trees (*Eucalypti*), and the pupa differs completely from that of the *Thyca Harpalyce* in being solitary.

This species is not so common as the *Thyca Harpalyce*, and has a rather swifter, although slow, flight, and keeps for the most part about the tops of the Gum and "Wattle" trees (*Acacia*), and on the so-called Native Cherry (*Exocarpus*), on the leaves of which the larva feeds as well as on the *Loranthus;* rarely approaching the ground level. There are two broods in the year, remaining in the pupa state about three weeks, varying according to the weather; a few of the last brood continue in the pupa state over the winter, the butterfly appearing in the spring. The males seem to be scarcer than the females, and are always smaller.

EXPLANATION OF FIGURES.

Plate 10.—Fig. 1, male, upper side, natural size. Fig. 2, female, upper side, natural size. Fig. 2*a*, female, under side, natural size. Fig. 3, pupa, natural size, showing the habit of attaching itself singly to twigs near tops of trees by the tail, and supporting the head in an upward direction by the fine silk thread slung round the body. This figure shows the bright coloring shortly before the escape of the butterfly, the colors being duller before. Fig. 4, larvæ, full size.

FREDERICK McCOY.

By Authority: JOHN FERRES, Government Printer.

Natural History of Victoria.

PRODROMUS

OF THE

ZOOLOGY OF VICTORIA;

OR,

FIGURES AND DESCRIPTIONS OF THE LIVING SPECIES OF ALL CLASSES

OF THE

VICTORIAN INDIGENOUS ANIMALS.

DECADE II.

BY

FREDERICK McCOY,

HONORARY FELLOW OF THE CAMBRIDGE PHILOSOPHICAL SOCIETY; CORRESPONDING MEMBER OF THE ZOOLOGICAL SOCIETY OF LONDON; HONORARY MEMBER OF SEVERAL OTHER SCIENTIFIC SOCIETIES, ETC.
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M DCCC LXXVIII.

PREFACE.

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It having been considered desirable to ascertain accurately the natural productions of the Colony of Victoria, and to publish works descriptive of them, on the plan of those issued by the Governments of the different States of America, investigations were undertaken, by order of the Victorian Government, to determine the Geology, Botany, and Zoology of the colony, to form collections illustrative of each for the public use, and to make the necessary preparations for such systematic publications on the subject as might be useful and interesting to the general public, and contribute to the advancement of science.

As the geological and botanical investigations have already approached completion, and their publication is far advanced, it has been decided to now commence the publication of the third branch completing the subject, namely, that of the Zoology or indigenous members of the different classes of the animal kingdom.

As the Fauna is not so well known as the Flora, it was a necessary preliminary to the publication to have a large number of drawings made, as opportunity arose, from the living or fresh examples of many species of reptiles, fish, and the lower animals, which lose their natural appearance shortly after death, and the true characters of many of which were consequently as yet unknown, as they had only been described from preserved specimens. A Prodromus, or preliminary issue, in the form of Decades or numbers of ten plates, each with its complete descriptive letterpress, will be published, of such illustrations as are ready, without systematic order or waiting for the completion of any one branch. The many good observers

in the country will thus have the means of accurately identifying various natural objects, their observations on which, if recorded and sent to the National Museum, where the originals of all the figures and descriptions are preserved, will be duly acknowledged, and will materially help in the preparation of the final systematic volume to be published for each class when it approaches completion.

This second Decade gives figures and descriptions in the first plate of two species of poisonous snakes too small to be dangerous to human life, but often causing needless alarm from being mistaken for the young of larger sorts. The second plate shows the famous Death Adder, reputed the most deadly for its size of all our poisonous snakes, and remarkable for the stinglike spine at the end of its tail, which is popularly mistaken for its dangerous wounding part. The third plate represents the largest of our Victorian serpents, the great Carpet Snake, sometimes eight to ten feet long, but, like the nearly related Boas of America and the Rock Snakes of Asia and Africa, perfectly harmless as far as the bite is concerned, as there are no poison fangs. The fourth plate represents for the first time the Gippsland Perch, now common in the markets. The fifth gives the large Murray Crayfish, or Lobster, as it is popularly called. The sixth and seventh plates illustrate the different forms and colors peculiar to the different stages of growth of the Arripis, popularly mis-called Salmon and Salmon Trout by the fishermen; to which so many cases of fish-poisoning have given a special interest, as well as its size, abundance, and general wholesomeness for food. The eighth plate gives proof of the identity of our Horse Mackerel with that of Europe and America. The ninth and tenth plates represent for the first time two species of the food fishes popularly called Rock Cod.

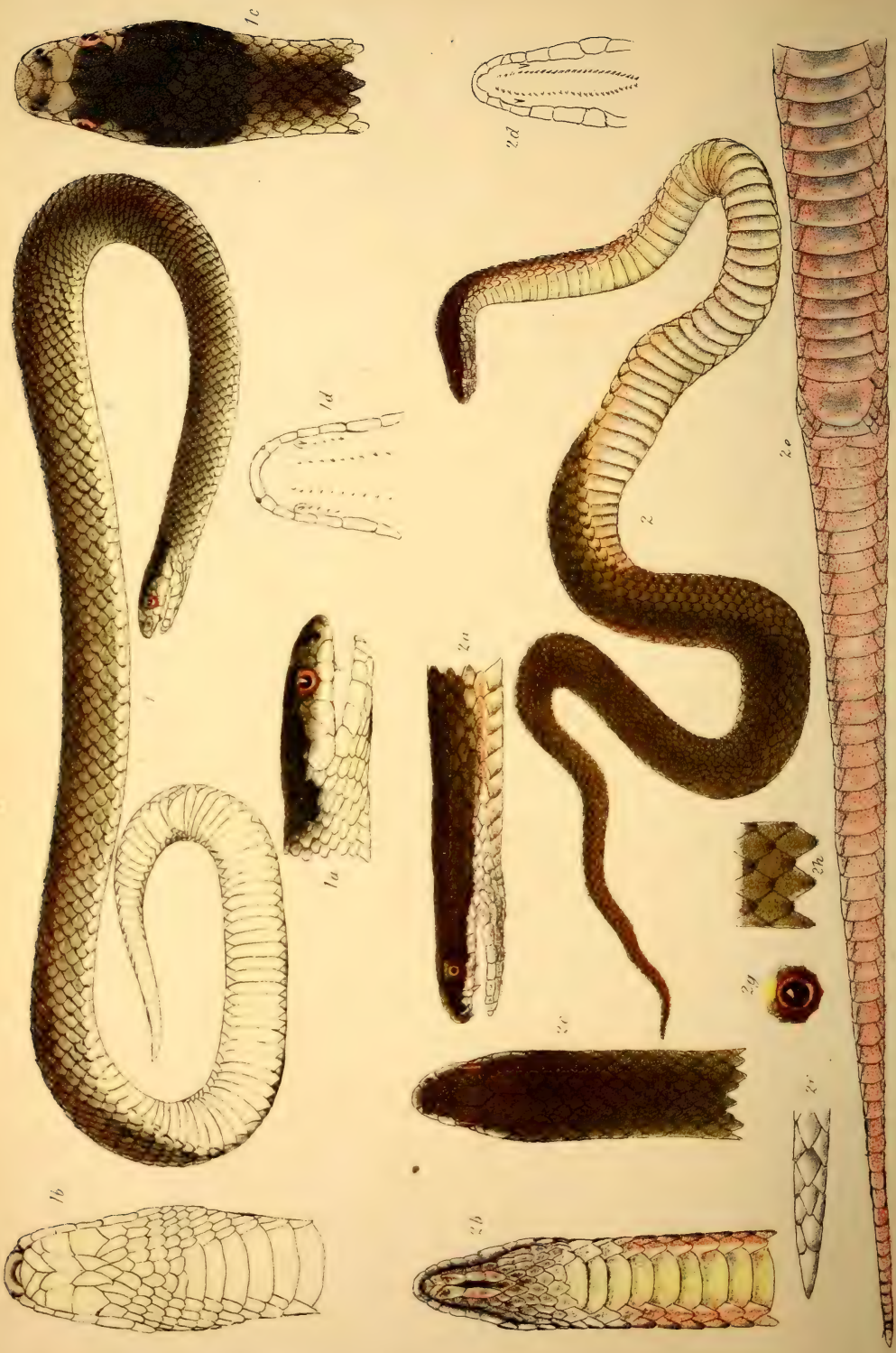
An unusual proportion of this Decade has been devoted to our fishes at the request of the Inspector of Fisheries, whose functions cannot be efficiently carried out in a new country without some

such means as our illustrations afford for the accurate identification of the fishes referred to in the regulations of that branch of the Service, and concerning the habits and time of spawning of which the local inspectors are required to report.

The succeeding Decades will illustrate as many different genera as possible, and will deal first usually with species of some special interest, and of which good figures do not exist, or are not easily accessible.

Frederick McCoy.

2nd October 1878.



Drawn by A. Barthelmess.

Prof. M.c Coy, direx.t

F. Schönfeld, lith

PLATE 11, FIG. 1.

HOPLOCEPHALUS FLAGELLUM (McCOY).

THE LITTLE WHIP SNAKE.

[Genus HOPLOCEPHALUS (CUV.). (Class Reptilia. Order Ophidia. Fam. Elapidæ.)
Gen. Char.—Body and tail moderately thick, gradually tapering. Head subquadrate, depressed, rounded in front. Rostral plate moderate; no loreal plate; one anterior and two posterior ocular plates; one nasal plate pierced by the nostril. Scales of back smooth, about 15 to 21 rows. Anal and subcaudal plates entire, in one row. Confined to Australia.]

DESCRIPTION.—Head considerably wider than the neck behind, tapering to a short blunt muzzle. *Scales:* usually 17 rows of scales across middle of back; ventral plates, 132 to 138; subcaudal, 25 to 27. Tail very short, ending in a conical point. *Plates:* rostral plate twice as wide as long, semielliptical; anterior frontals small; posterior frontals moderate, rectangular behind; vertex plate hexagonal, about one-fourth longer than wide, anterior end very obtuse, posterior end obtuse but nearly rectangular; occipitals elongate, moderate, one-fourth longer than wide; superciliary moderate; two posterior ocular plates smaller than the one anterior ocular; six upper labials, 2nd and 3rd touching the anterior ocular; nasal plate long. Anal plate sometimes divided, usually undivided, large. *Color:* pale umber-brown, whitish below, edges of scales slightly lighter, subjacent skin black; the whole crown of the head with a large black patch, lowest on the sides at the back, but not so low as the bend of the angle of mouth or labials, rising towards the eye, leaving the post-oculars white, but touching the eye above from the superciliary being black, and these with the vertex plate form its anterior boundary, leaving all the rest of the anterior part of the head white except a narrow separate black band extending from one nostril to the other across the middle of the anterior frontals and middle of rostral plate. *Teeth:* there are usually four small solid teeth behind the fang and about ten in each of the two palate rows.

To show the small variation of the number of scales of back and the abdominal and subcaudal plates, I subjoin particulars of eight specimens in the National Museum collection:—

Specimens.	Number of Rows of Scales on Back.		Plates.		Total.	
	Middle.	Base of Tail.	Ventral.	Subcaudal.	Length.	Tail.
					in.	in.
1. Boroondara ...	17	15	137	27	11½	1¼
2. „ ...	18	15	138	26	12¼	1½
3. „ ...	18	15	138	25	...	...
4. Prahran... ...	18	15	137	25	11½	1¼
5. South Brighton ...	18	15	136	27	12¾	1⅝
6. „ ...	17	16	132	27	10½	1¼
7. Caulfield ...	17	15	136	25	...	...
8. Mount Martha ...	17	14	137	25	12¾	2

This little snake seems very local in its distribution ; it often excites alarm from being taken for the young of the Brown Snake, but it rarely reaches a foot in length, and is no more injurious than the sting of a bee, although its little poison fang and gland are on the usual plan of construction of the large dangerous species. It feeds on the small young of frogs and lizards.

Common at Brighton beach, being often dug out of the light sandy soil of gardens from a depth of several inches, and occasionally at Caulfield and Boroondara.

This species has not been figured before.

EXPLANATION OF FIGURES.

PLATE 11.—Fig. 1, ordinary specimen, natural size. Fig 1*a*, side view of head, magnified. Fig. 1*b*, under side of head, enlarged. Fig. 1*c*, upper side of head, enlarged, to show shape of plates and disposition of the black marking. Fig. 1*d*, palate, enlarged, to show teeth.

PLATE 11, FIG. 2.

HOPLOCEPHALUS CORONOIDES (GÜNTH.).

THE WHITE-LIPPED SNAKE.

DESCRIPTION.—Head very narrow, tapering from nape of neck to semi-elliptically rounded muzzle. *Scales:* usually 15 rows of scales across middle of back; ventral plates, 138 to 146; subcaudal plates, 43 to 51. *Plates:* vertex plate parallel-sided, hexagonal, about three times longer than wide, anterior and posterior ends alike in some specimens, but the anterior angle more obtuse in others ; rostral plate large, with an obtuse upper angle; superciliary plates, anterior ocular plates, and occipital plates long. *Color:* above usually plain brown or with a tinge of olive ; under side usually yellowish near the throat and salmon color from middle to tip of tail, the yellowish plates freckled with red, and the more posterior ventral plates freckled with grey. Lower labial and throat plates minutely freckled with black. A white streak extends from rostral along upper lip for about an inch, or sometimes nearly two, along side of neck ; a strong black upper edge separates this white band from the color of the upper surface, and an imperfect lower edging in parts of some specimens.

REFERENCE.—Günther Cat. Col. Snakes, p. 215.

In some specimens the under side is darker from a greater extent of the grey speckling. In spirit the upper surface becomes paler and more olive, and the under surface more of a dark slate color. The distinct white band along the upper lip and side of neck with

its black upper margin easily distinguishes this beautiful little snake from all others. It has been supposed hitherto to be peculiar to Tasmania, but it certainly (like the *H. superbus*, also supposed not to occur on the mainland) is a not uncommon species about Melbourne.

I subjoin particulars of four specimens to show the small range of variations in the scales and plates. This species is too small to produce any serious injury by its bite.

Specimens.	No. of Rows of Scales on Back.		Plates.		Total.		
	Middle.	Base of Tail.	Ventral	Sub-caudal.	Length.	Tail.	Gape.
					in.	in.	lines.
1. Upper Yarra	15	14	139	47	13	$2\frac{1}{2}$	$4\frac{1}{2}$
2. Bullarook Forest ...	16	14	138	51	$8\frac{1}{2}$	$1\frac{1}{2}$	4
3. Yarra-bank	15	14	139	46	$14\frac{1}{2}$	$2\frac{1}{2}$	6
4. Melbourne	15	14	146	43	$13\frac{1}{2}$	$2\frac{1}{2}$	6

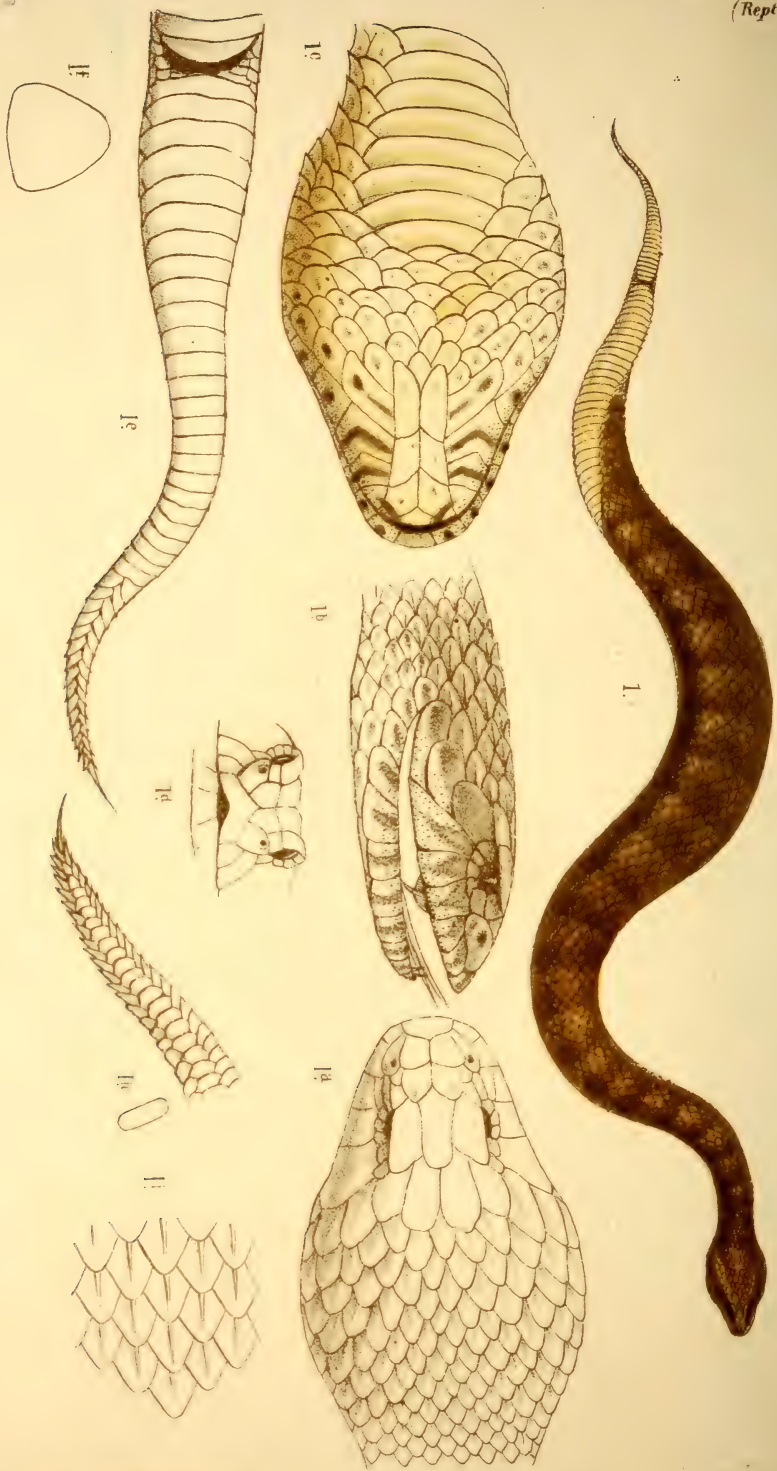
The figured specimen is that from Yarra-bank, while the one from Bullarook Forest was remarkable for a more general rusty reddish coloring.

The head only has been figured of this species before.

Explanation of Figures.

Plate 11.—Fig. 2, ordinary specimen, natural size. Fig. 2*a*, side view of head, twice the natural size, to show the white band from nostril along the labial plates. Fig. 2*b*, under side of head and neck, twice the natural size, to show the form and coloring of the plates. Fig. 2*c*, upper view of head, twice the natural size, to show the forms of the head plates. Fig. 2*d*, view of palate, twice the natural size (in addition to the two rows on palate, there should be shown three or four small solid teeth behind the poison fang; they have disappeared in the lithographing). Fig. 2*e*, under side of abdominal and subcaudal plates, twice the natural size. Fig. 2*f*, upper side of end of tail, enlarged. Fig. 2*g*, eye, enlarged. Fig. 2*h*, some scales of back, enlarged.

Frederick McCoy.



Ludwig Becker, del & lith

Prof. M'Coy, dirext.

Hamel & Co. imp.

PLATE 12.

ACANTHOPHIS ANTARCTICA (SHAW SP.).

THE DEATH ADDER.

[Genus ACANTHOPHIS (Daud.). (Sub-kingd. Vertebrata. Class Reptilia. Order Ophidia. Fam. Viperidæ ?)

Gen. Char.—Head large, broad, flat, wider than the neck behind, with very prominent superciliary ridges over the eyes. Neck narrow; body short, thick; tail short, with a trigonal section at base, but becoming very slender, and compressed towards the posterior end, with a recurved thorn-like spine, directed obliquely upwards at the extremity. Nostril large, between two rostral plates; no loreal plate; one large anterior longitudinally-grooved ocular plate, and two posterior ocular plates; two small subocular plates below the eye and over the 3rd and 4th labials. Rostral and two anterior frontals moderate, anterior ocular forming part of upper surface; vertex plate hexagonal or subpentagonal, one-third or one-fourth longer than wide; labials large, seven or eight below, six above, with a large temporal plate between the two hinder (5th and 6th); subcaudal plates in one row till near the narrow end. Scales of back keeled, most distinctly so in the anterior part, the keel becoming obsolete towards the hinder end. Eye small, pupil elliptical, erect. *Teeth*:—Fangs very large, perforated, fixed, 2 or 3 small teeth close behind each; no other teeth in upper jaw; two long rows of teeth on the palate bones; solid teeth of lower jaw small. Confined to Australasia.]

DESCRIPTION.—Body short, thick, rounded. *Scales:* plates on hinder part of head irregularly indented, grooved, and ridged, like large imbricating scales; scales on neck and anterior part of back strongly keeled, on hinder part of body larger, rounder, and thinner than in front. *Color:* dull greyish-brown, with about 40 darker brown transverse bands; tip of tail dull orange-yellow; ventral and subcaudal plates paler and blotched with blackish; labial and chin shields beautifully marked with blackish-brown marks, leaving the edges cream colored, the upper labials often minutely dotted with black and pink, the lower labials with the middle portion occupied by a dark blotch, approximately following the outline, but leaving a broad cream-color margin. One or two of the lateral rows of scales usually cream-color, and with a black blotch in the middle of the base; the small scales of the throat have each a small dark spot in the middle.

Specimens.	Scales of Back.		Plates.		Length.	
	Across Middle.	Over Base of Tail.	Abdomen.	Tail.	Total.	Tail.
					ft. in.	in.
1	21	17	119	$24\frac{19}{19}$	2 $8\frac{1}{2}$	4
2	21	17	119	$24\frac{13}{13}$	1 $9\frac{1}{2}$	$3\frac{3}{4}$

Specimens of about 2 feet long are about 2 inches in diameter.

REFERENCE.—Wagler. Syst. 172. *Boa antarctica*, Shaw. Misc., t. 35. *Vipera acanthophis*, Schlegel. P. S., t. 21, f. 21, 23. *A. cerastinus* Lacep. An. Mus., v. 4, 10. *A. Browni* Leach. Zool. Misc., v. 1, t. 35.

This is the only Australian snake approaching the true viperine venomous snakes in having the fangs perforated and not grooved; they are, however, not so movable, but permanently erect, as in the *Elapidæ:* the whole of the characters of the singular genus *Acanthophis* (of which the present species is the only one known) incline to classing it in the family *Viperidæ* rather than with Colubrine snakes, although it is intermediate between the two groups in many respects. The popular name seems to be indifferently Death Adder or Deaf Adder. The harmless horny spine at the end of the tail is its most dangerous weapon, in the popular belief. It is generally supposed to be the most deadly of all the Australian snakes. A large dog bitten by a captive Death Adder in one of Dr. Halford's experiments was dead in 18 minutes.

When irritated it flattens the thick part of the body very greatly, and has a peculiar action of snapping to one side and the other alternately with great quickness when about to strike.

Not found in the southern parts of Victoria, but common in the hot tracts near the Murray.

EXPLANATION OF FIGURES.

Plate 12.—Fig. 1, view of ordinary specimen one-fourth the natural size. Fig. 1*a*, head viewed from above, natural size (the longitudinal keel-like ridges and sulci on the plates and scales not sufficiently distinct). Fig 1*b*, side view of head, natural size (the longitudinal groove in the anterior ocular is too definite or too much like a suture dividing two plates). Fig. 1*c*, head viewed from below, showing the chin and throat plates. Fig. 1*d*, front view of snout. Fig. 1*e*, under side of tail, natural size, showing the two rows of small scales at the compressed narrow termination beyond the single row of subcaudal plates. Fig. 1*f*, form of section of tail at base. Fig. 1*g*, side view of compressed slender portion of tail, with terminal spine. Fig. 1*h*, form of compressed section of posterior part of tail. Fig. 1*i*, keeled scales of back of neck.

FREDERICK McCOY.

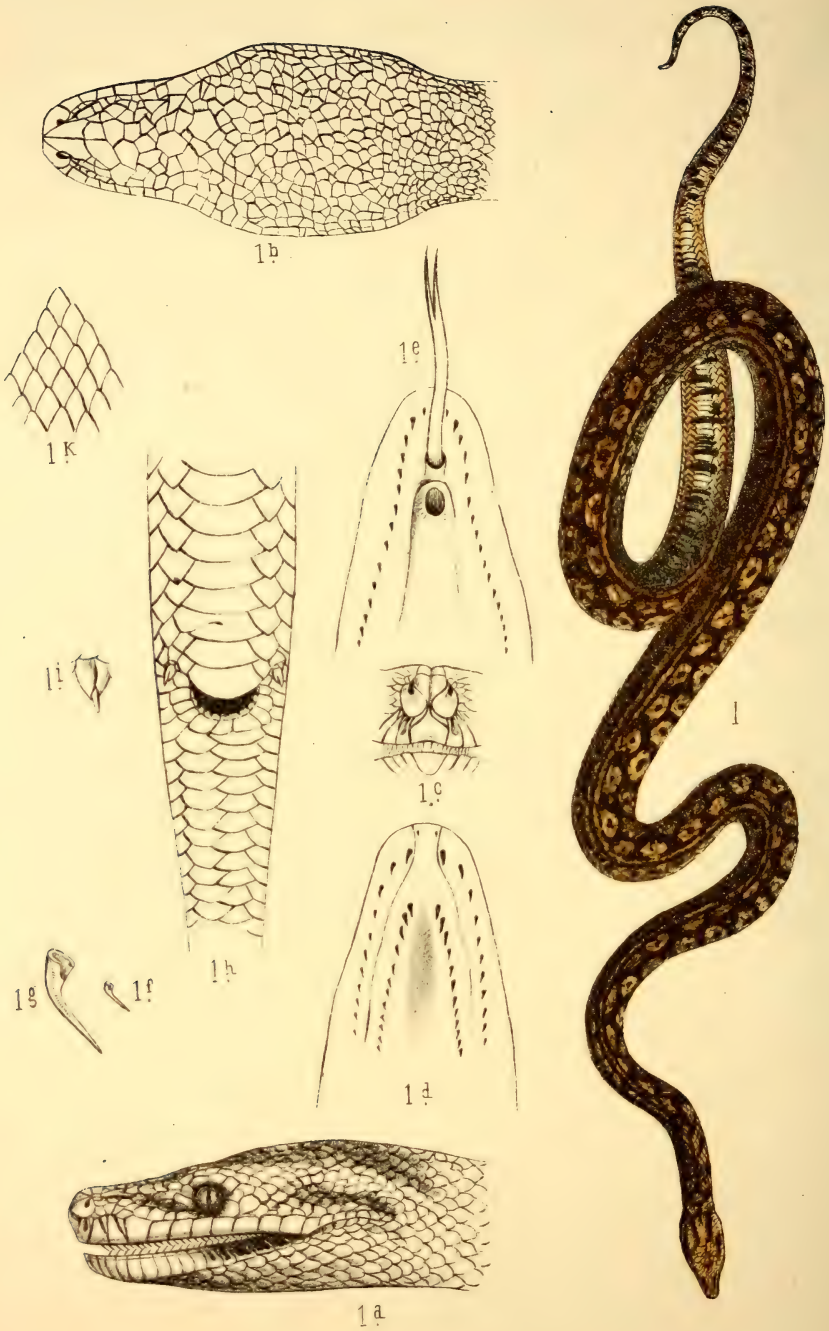

1b
1k
1e
1i
1c
1h
1g
1f
1d
1a
1

PLATE 13.

MORELIA VARIEGATA (GRAY).

THE CARPET SNAKE.

[Genus MORELIA (Gray). (Sub-kingd. Vertebrata. Class Reptilia. Order Ophidia. Fam. Pythonidæ.)

Gen. Char.—Head moderate, ovate, flat above, broadly rounded behind; muzzle truncated. Neck narrow. Body long, moderately thick. Tail very short, prehensile, spirally inrolled, and with a pair of rudimentary legs, like short conical spurs, one on each side of its base below. Plates on top of head very small, numerous, irregular, scale-like; three frontal plates on each side; vertex plate very small, polygonal; rostral pentagonal, with a groove-like pit on each side of the upper margins; nostril in one plate, slightly grooved below; three front upper labials, and seven or eight hinder lower labial plates, with a deep pit in each. Eyes surrounded by ten small plates forming three-fourths of a circle, touching the sixth and seventh labials below. Pupil elliptical, erect. Scales of back small, smooth; abdominal plates narrow; subcaudals in two rows. Confined to Australia.]

DESCRIPTION.—*Color:* ground color, nearly uniform pale-brown having a tinge of greenish grey, with an irregular darker carpet-like pattern, usually of a long narrow dark streak surmounted by one of the light ground color of the same width, forming a double band along each side from head to near base of tail. The back is marked out into three or four rows of irregular lozenge-shaped patches of the pale ground color, usually with a blackish-brown blotch in the middle and margined by a broad blackish-brown outline. The upper part of the head is of the pale ground color, with one longitudinal dark streak from the nostril through the eye to the lateral angle of the head, where it usually joins a broad V-shaped round mark diverging from the vertex or first median plate on each side to near the lateral posterior angle of the head. From this V-shaped mark a short branch extends to near the middle of the eye. Between the posterior diverging ends of the V-shaped mark is a very constant broad rhombic dark-brown mark, extended posteriorly along the middle of the nape of the neck, and having a light patch in the middle of its broadest part. Belly pale-yellowish. The abdominal and subcaudal plates irregularly marked with blackish-brown blotches. Under part of head and neck pale without spots. *Teeth:* all the teeth are solid, of moderate size, and curved backwards; 2 on intermaxillaries in front of mouth, 11 on each side of upper jaw, and 12 on each palate bone, of which the 3 anterior are largest, the 1st one-sixth of an inch long, the hinder ones only one-sixteenth of an inch long; 15 to 17 in lower jaw, the 1st smallest, the 2nd one-tenth of an inch long, the others decreasing backwards.

Specimens.	Scales of Back.		Plates.		Length.		
	Across Middle.	Over Base of Tail.	Abdomen.	Tail.	Total.		Tail.
					ft.	in.	in.
1. From Echuca	44	20	275	74–74	5	9	8
2. From Banks of Murray ...	44	20	274	75–75	5	0	7
3. From Swan Hill (young)	42	19	272	73–73	2	4	3¾
4. From Banks of Murray ...	43	20	280	76–76	6	6	11

REFERENCE.—Gray, Zool. Misc. 43, 54.

This is by far the largest snake in Victoria, but, like all the family *Pythonidæ*, or Rock Snakes, is perfectly harmless; all the teeth being small and solid, without groove or canal, and no poison gland being developed. Seven or eight feet is the largest size usually found, but individuals of ten feet long have been seen. The pattern of the coloring is very variable, but has some resemblance to some of the commoner sorts of Kidderminster carpets, as suggested by the popular name of Carpet Snake applied to it for many years in Victoria and New South Wales. The name Carpet Snake is, unfortunately, applied to the poisonous Tiger Snake in Tasmania, producing some confusion which the publication of recognizable figures of the two will obviate in future.

The Carpet Snake feeds on small quadrupeds, and poultry and other birds of similar size, which it crushes to death by winding round them before swallowing; catching them at night. The Carpet Snake, like the American Boa, can hang by the short prehensile tail coiled round a branch, with the two little leg-like spurs acting in opposition to effect a grasp or firm hold.

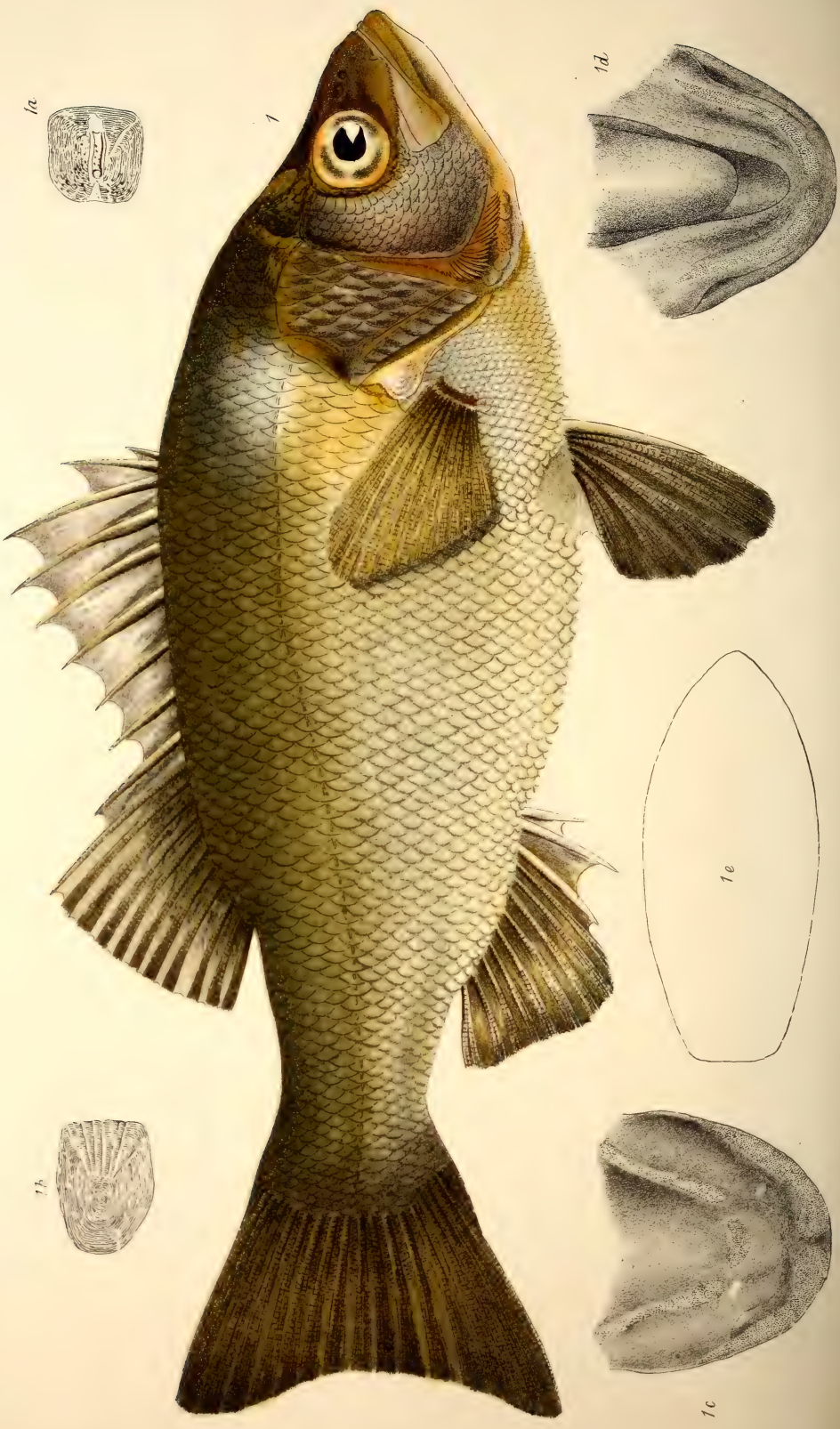
Not found in the cooler southern parts of the colony, but becoming common towards the northern Murray boundary.

EXPLANATION OF FIGURES.

PLATE 13.—Fig. 1, specimen, one-fifth the natural size. Fig. 1*a*, head, side view, natural size. Fig. 1*b*, top of head, natural size. Fig. 1*c*, front view of snout, natural size. Fig. 1*d*, inner view of mouth, showing rows of teeth on the jaws and palate. Fig. 1*e*, inner view of lower jaw, showing the tongue with its sheath and the teeth on lower jaw. Figs. 1*f* and 1*g*, first palatine tooth, natural size, and magnified. Fig. 1*h*, base of tail, showing small abdominal spurs. Fig. 1*i*, spur, magnified. Fig. 1*k*. scales, natural size.

FREDERICK McCOY.

Pl. 14.



A. Bartholomew, del. & lith. Prof. M.c Coy, direx.t De Gruchy & Leigh, imp.

PLATE 14.

LATES COLONORUM (GÜNTH.).

THE GIPPSLAND PERCH.

[Genus LATES (Cuv.). (Sub-kingd. Vertebrata. Class Pisces. Order Acanthopterygia. Fam. Percidæ.)

Gen. Char.—Ovate, moderately compressed; scales moderate; operculum with strong posterior spines; preoperculum serrated with strong teeth on the angle and lower edge; preorbitals strongly serrated; all the teeth small, villiform on the jaws, palate, and vomer; tongue smooth; anterior dorsal with seven or eight spines; anal fin with three spines; no pseudobranchiæ; six or seven branchiostegal rays. Fresh and brackish waters of Africa, India, and Australia.]

DESCRIPTION.—*Rays:* branchiostegals 6; first dorsal with eight strong spines, first about half the length of the second, which is little more than half the length of the third, which is the longest, the eighth little longer than the second; second dorsal fin with the first ray a strong spine, one-fourth longer than the last ray of the anterior dorsal, followed by 9 or 10 branched rays, the first longest and about two-fifths longer than the spinous ray; ventral fin with 1 strong spine and 5 branched rays, the first one two-fifths longer than the spine; anal fin with 3 strong spines and 7, 8, or 9 branched rays; pectoral fin 12, 13, or 14; caudal fin 17 or 18, with 4 short rays above and 4 short rays below. *Scales:* tubular along lateral line, 54, beyond without tubes, to base of tail, 6; in front of dorsal, above lateral line 8 or 9, below lateral line 19 to 21. *Form:* ovate, compressed, dorsal profile more convex than the ventral one, curving rapidly from greatest depth in front of dorsal fin to behind eye, thence concave to over front of orbit, then convex to snout; length of head three and three-fourths to three and one-third the length from snout to base of caudal fin; greatest depth from three to three and one-fifth in length to middle edge of caudal; diameter of eye nearly equal to length of snout, or about one-fourth of length of head; lower jaw longer than the upper. Caudal fin only slightly emarginate; preoperculum naked, with the posterior edge finely serrated, the angle obtusely rounded, it and the lower edge with large irregular unequal triangular spines directed downwards and forwards; operculum with a strong triangular sharp-pointed spine, with a shorter blunt one over it near the origin of the lateral line, and some smaller irregular ones between them; preocular, suboperculum, and interoperculum finely serrated. *Teeth:* very small, villiform, a band about 130 long and 25 rows broad in front, tapering to posterior end on each upper jaw; a much smaller band on each palate bone, about 109 in the length, 15 rows across anterior, and tapering to eight across the posterior end; patch on vomer subtrigonal or semilunar; band on lower jaw, about 135 teeth in the length and 14 across the anterior end. *Color:* dark greenish-olive on back, grey on sides, and white on belly; middle of the dorsal scales bright-silvery; front of head and mouth purplish; cheeks with green and red reflections; pectoral and first dorsal very pale, slightly clouded with grey; the other fins darker brownish-grey; iris bright yellow, with orange clouds.

REFERENCE.—Günther, Ann. and Mag. Nat. Hist., Feb. 1863, p. 114.

This fish occurs in great abundance in the Gippsland lakes opening into the sea, and is brought to the markets at Melbourne

in large quantities in the cold months ; it occurs also at Sandridge and at the mouth of the Saltwater River. The flesh is moderately good for the table.

The previously described species of *Lates* inhabit the Nile and the mouths of some of the large Indian rivers.

The following are the detailed measurements of a large example :—

Measurements.	Ins.	lines.
Length from snout to distal end of caudal	20	0
„ of caudal	3	9
„ from snout to anterior edge of orbit	1	2
„ of eye	1	1
„ of head to end of operculum	4	9
„ from snout to anus (measured along ventral edge) ...	12	0
„ from snout to base of pectoral	4	9
„ from snout to origin of first dorsal	6	6
„ of pectoral	2	9
„ of first dorsal	4	0
„ of second dorsal	3	0
„ of anal	2	1
„ of ventral	2	10
„ from snout to base of ventral	6	3
Greatest height of anal	2	5
Width between eyes	0	10
Depth of body in front of dorsal	6	6
Thickness of body in front of dorsal	3	3
Height of first dorsal	1	7
Height of second dorsal	2	4

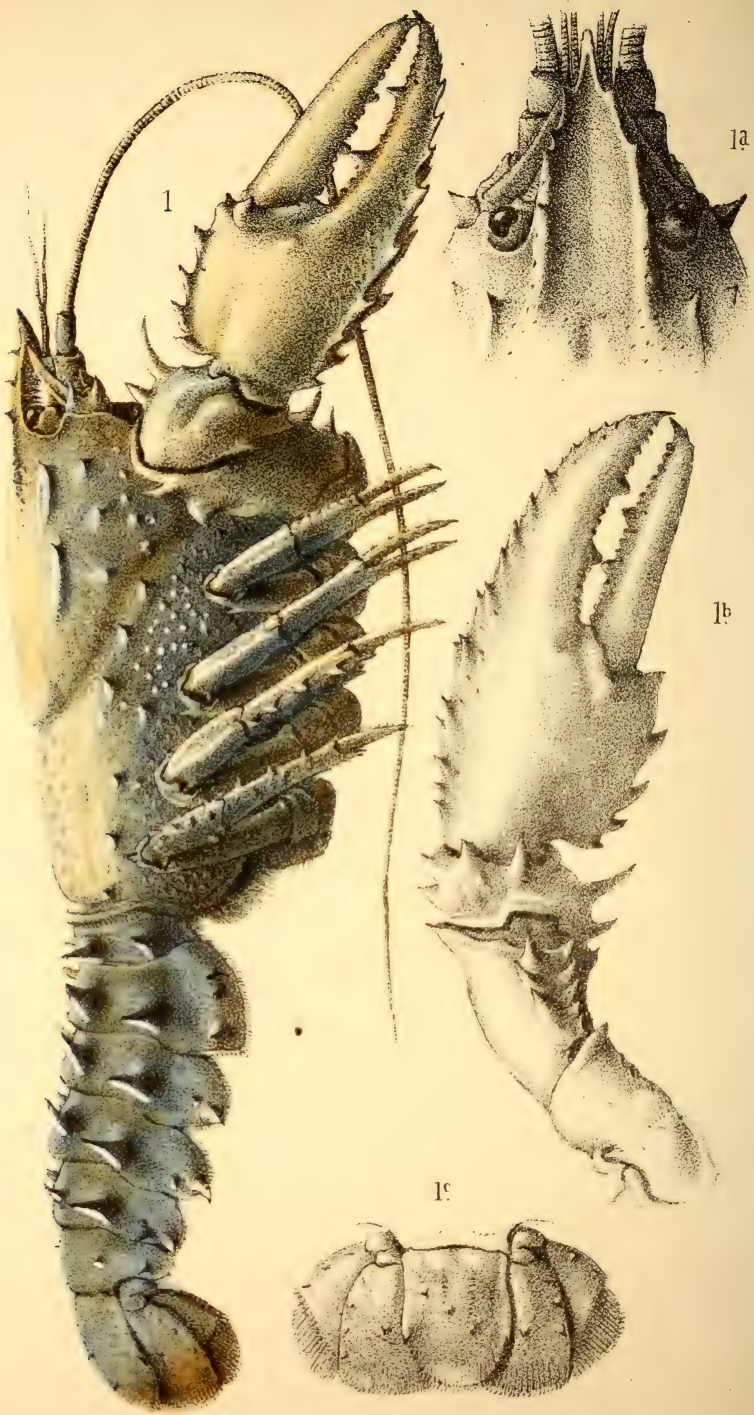
I have seen some specimens a little longer in proportion to the depth, probably constituting the *L. antarcticus* of Count Castelnau, and in one of them the teeth of the lower edge of the preoperculum are partially directed backwards as he describes, but this seems in my specimen to be an irregular growth from injury.

This fish has not been figured before.

Explanation of Figures.

Plate 14.—Fig. 1, seven-twelfths the natural size, with the colors of the living fish. Fig. 1*a*, scale from lateral line, magnified two diameters. Fig. 1*b*, scale from above lateral line, twice the natural size. Fig. 1*c*, inner view of mouth, three-fourths of natural size, showing the villiform teeth of the jaws, vomer, and palate bones. Fig. 1*d*, inner view of lower jaw, showing tongue and the villiform row of teeth on the jaws. Fig. 1*e*, form of section in front of dorsal.

Frederick McCoy.



Ludwig Becker. del. & lith. Prof. M.ᶜ Coy, direx.ʳ Hamel & Cᵒ imp.

PLATE 15.

ASTACOIDES SERRATUS (SHAW SP.).

THE MURRAY LOBSTER.

[Genus ASTACOIDES (Guér). (Sub-kingd. Articulata. Class Crustacea. Order Macrura. Fam. Astacidæ.)

Gen. Char.—General form and characters of *Astacus*, but with the first segment of the abdomen destitute of appendices. Abdominal feet membranous, with a row of small calcareous plates on each margin. Outer pair of tail fins jointed, with the distal portion thinner and less calcareous than the proximal one. Inner lobes not distinctly jointed, and calcareous to the end. Rivers of Madagascar and Australia.]

DESCRIPTION.—Beak elongate, acutely pointed at the apex, hollow above, with three or four strong teeth on the lateral bounding ridge of each side, usually a little longer than the base of the outer antennæ. Carapace with several large scattered spines on the sides in front of the nuchal furrow, which is very deeply impressed. One or sometimes two rows of large conical spines border the posterior side of the nuchal furrow, and extend along the division between the lateral vertical portion of the carapace and the horizontal dorsal portion. Whole of the vertical sides behind the nuchal furrow, or branchial regions, covered with small round prominent irregular tubercles about their own diameter apart; hepatic region or sides of the carapace in front of nuchal furrow set with numerous scattered conical spines, the upper ones larger. Segments of the abdomen having a row of very large conical spines on each side of the middle, the points usually directed slightly forwards; outside of this a second row of still larger ones, and, nearer the outer end, a third row, slightly more slender, not occurring on the first segment or the last, but two of which are usually found on the dilated margin of the second segment. The middle segment of the tail fin is sometimes smooth, but sometimes has 3 or 4 small conical spines and a variable number of smaller and more numerous pointed tubercles. Anterior feet or claws nearly equal: the outer edge of the hand has a row of 13 or 14 large compressed spines, with a second row a little beneath in the middle portion; the inner edge of the hand has usually 5 smaller spines, and there is a blunt conical one on the upper aspect, about a third of the width from the inner edge, at junction with carpus; outer edge of last joint or movable finger smooth, rounded. Carpus with 3 sharp conical spines on the outer edge and 3 much stronger on the inner edge, of which the anterior one is much the largest, and the anterior edge has 2 strong conical spines on the lower aspect. The next joint of the leg has 2 rows of large conical spines on the lower edge, and from 4 to 8 irregularly disposed on the upper edge. Four hinder pairs of legs with very irregular small spines. Anterior median triangular process of epistome about as long as wide. The outer antennæ are inserted below the inner ones. *Color:* the anterior legs, the middle of the back, and the apices of the spines and tubercles rich creamy white or ivory color; the ground color of the other legs, sides of carapace, and the abdomen pale prussian blue of varying intensity in different individuals, or sometimes mottled with dull olive-green. The semi-corneous flexible edges of tail fin brownish. Length of large specimen from snout to tip of tail, 12 inches 6 lines; diameter of carapace, 3 inches; length of carpus, 1 inch 7 lines; length of hand, 4 inches 3 lines; width of hand, 2 inches 3 lines.

REFERENCE.—*Cancer serratus*, Shaw. Zool. N. Hol. t. 8.—*Potamobius id.* White, P. Zool. S. 1850, p. 95.—*Astacoides spinifer*, Heller, Reise der Novara Crustaceen. Zoologisher Theil. Band. 11. Abtheil. 3, p. 102, t. 9.—*Astacus armatus* Von Martens, Ann. and Mag. Nat. Hist. 1860, p. 359.

M. Guérin-Méneville in the Revue Zoologique for 1840, p. 109, established the genus *Astacoides* for the large freshwater Crayfish of the Madagascar rivers, mainly distinguishing it from *Astacus* by the supposed absence of the small basal scale of the outer antennæ, which however is distinctly present, as noted by Professor Dana in the "United States Exploring Expedition:" but Erichson, in the Archiv für Naturgeschichte for 1846, p. 86, in his "Uebersicht der Arten der Gattung Astacus" re-defines the genus, noting that in the males there are no appendages to the first abdominal ring, and that those of the second ring are similar to those of the succeeding rings, this being really the most important character of the genus.

This gigantic species is now sent to the Melbourne market in considerable quantity from the Murray by railway for the table instead of lobsters, and is by far the most delicious of the few Victorian crustacea good for food.

All the spines vary in size and number, not only in different individuals, but on the two sides of the same one. The blue color is very much stronger in some individuals than in others, and I notice (Bibl. Univ. 15 Mars, 1870) that some of the reddish Crayfish in the rivers of Switzerland are said by local observers to be blue when recently moulted. Some specimens are olive-green where the blue appears in others.

I can have no doubt that the *A. spinifer* (Heller) described by him in the treatise on Crustacea in the "Voyage of the Novara," is identical with Shaw's species, although the spines on the middle lobe of the tail are more numerous than I have seen; and it is clear that Von Martens' *A. armatus* is also a synonym.

Very common in the River Murray, where it is caught by lowering a piece of bagging, with cords and floats to the four corners, with some flesh in the middle; this being pulled up every now and then shows three or four of the "Lobsters" feeding; a bit of meat at the end of a string suffices to catch them.

EXPLANATION OF FIGURES.

PLATE 15.—Fig. 1, side view of specimen, rather bluer than usual, half the natural size. Fig. 1*a*, rostrum and base of antennæ natural size of small specimen. Fig. 1*b*, anterior leg, viewed from inner side of small specimen, natural size. Fig. 1*c*, tail fin, half the natural size.

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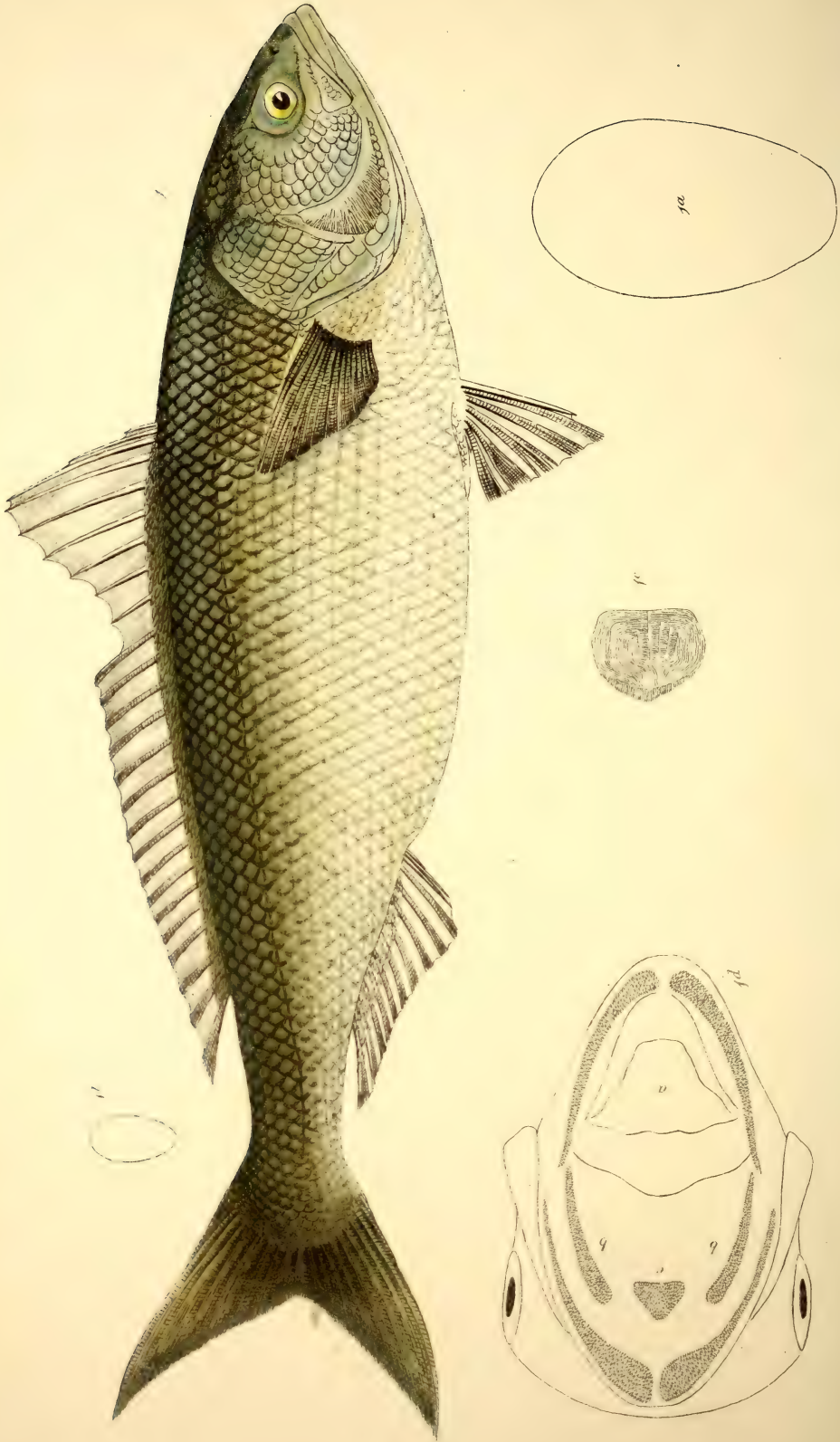

fa
Pl.
p
q
q
a

1d
1b
1a
1
2a
2b
2
1c
2c

Plates 16 and 17.

ARRIPIS TRUTTACEUS (Cuv. and Val. sp.).

The Salmon Arripis.

[Genus ARRIPIS (Jenyns). (Sub-kingd. Vertebrata. Class Pisces. Order Acanthopterygia. Fam. Percidæ.)

Gen. Char.—Form moderately elongate, fusiform. Branchiostegal rays 7. All the teeth villiform; numerous rows of teeth on the palatine bones and on the vomer. Tongue smooth. One dorsal fin with nine slender spines and several branched rays. Anal fin with three spines and several branched rays. Caudal fin deeply forked. Preoperculum denticulated. Scales very finely ciliated at posterior edge; fan of diverging ridges nearly or quite obsolete, replaced by fine close striæ parallel to the anterior truncated margin. Pyloric appendages numerous. Confined to Australia.]

Description.—*Form:* regular, elongate, fusiform; top of the head flat or slightly convex, and destitute of scales, the lateral boundaries formed by the lateral projecting ridges of the upper edges of the orbits. Diameter of orbit one-fourth of the length of the head in specimens of ordinary length of 12 inches, (a smaller proportion in larger specimens) and about its own length from tip of snout, but one-sixth less than distance between the superciliary ridges across top of head; depth one-ninth less than the length of the head: length of head $3\frac{3}{4}$ in the total length to middle margin of caudal fin. *Fin-rays:* ventral, 1 spinous and 5 or 6 branched; pectoral, usually 16; anal, 3 spinous and usually 10 branched, last two from one base; dorsal, 9 spinous and usually 16 branched; caudal, 17, with 4 to 5 short ones above and 4 to 7 short ones below. *Scales:* along lateral line, with tubes, about 50; without tubes, on tail, about 3 or 4: vertical rows of scales, 6 above lateral line; 12 below lateral line. *Color:* back and sides above lateral line blackish-olive (with, in some lights, a bluish-black cast), clouded with large irregular ill-defined darker spots, indistinctly arranged in vertical groups, in individuals of 11 inches or more in length, but forming about 28 alternately longer and shorter narrow distinct vertical bands in specimens of 8 inches or less, gradually becoming paler to the level of lower edge of pectoral, and destitute of the darker mottling, and with a pale greenish-bronze metallic reflection, becoming silvery or pearly-white, with slight pink or blue reflections, on lower part of throat, abdomen, and tail; operculum and preoperculum reflecting and colored like side of body; interoperculum and suboperculum white and silvery, like abdomen; top of head, snout, and both lips, in front of eye, and portion of skin outside the iris, sooty-black; hinder part of dentary bone white; iris greenish-gold, with a blackish arched mark above and below; along, or slightly under lateral line, a row of about 12 large round spots of the color of lacquered brass, about their own diameter apart, and of about equal size from operculum to tail, and below this 3 or 4 similar but shorter rows. Pectoral fin rich indian-yellow, with a blackish base, tip, and edge. Ventral fins almost colorless, pinkish at base, yellowish for distal two-thirds. Dorsal membrane pale blackish, with yellowish rays, the branched tips of those of the second dorsal forming a dark border to the fin, the membrane minutely dotted with black under the lens. Anal fin colorless, like ventral, but the membrane with microscopic black dots, and the branching ends of the rays blackish. Caudal fin very dark-olive, with the tips and posterior edge blackish. Pancreatic cæca of pylorus of very numerous (170) short slender branches, chiefly simple.

The following are the dimensions of an average specimen such as may commonly be found in the market with the adult characters:—

Measurements.	Ins.	lines.
Length from tip of snout to distal end of caudal fin	24	0
„ from tip of snout to middle of posterior edge of dorsal fin ...	17	0
„ from tip of snout to end of body	20	6
„ of caudal	4	3
„ from snout to edge of preoperculum	4	3
„ from snout to base of pectoral	6	2
„ from snout to anterior edge of orbit	1	5
Antero-posterior diameter of orbit	1	4
Length of head from snout to edge of operculum	5	7
„ from snout to anus	14	0
„ of pectoral	2	7
„ of anal	3	0
„ of ventral fin	2	5
Breadth between eyes	1	10
Depth of body in front of first dorsal	6	0
Greatest thickness of same below lateral line	4	2
Greatest height of dorsal at third spine	2	2
Height of last spine	0	11
Height of next branched ray	1	4

Young specimens up to 3 or 4 inches long have the sides of the head behind the eye and lower half of the body whiter and more silvery than the larger ones, with 2 or 3 longitudinal rows of round brassy spots, the length of the uncovered portion of two or three scales in diameter; the back and upper part of sides above the lateral line of a brownish-grey olive, lighter than in older individuals, with from 15 to 17 distinct transverse darker bands, only two or three of which show any indication of breaking up into blotches or spots, as in the older individuals. Pectoral bright-yellow, with black base; caudal yellowish-olive; snout brownish. The depth of the body varies considerably at this size (from $3\frac{1}{2}$ to 4 times in length of body, without fin); the length of head in each case being $3\frac{1}{2}$ times in length without caudal fin. The thickness also in each of these cases remaining constant for this size at one-eighth of the length without caudal, although, of course, in the one case it was half the depth, and considerably less in the other. Iris yellow. The denticulation of the preoperculum does not exist in this young stage on the posterior edge (thus agreeing with Cuvier's *Centropristes truttaceus*), although stronger, and terminating more distinct and direct ridging on the lower margin, than in the adult; and at this size the diameter of the orbits equals the space between the eyes, as in Sir J. Richardson's *C. salar*, so that they grow proportionately smaller with age.

To show the constancy of the fin-rays and scales in this species, I subjoin particulars of seven specimens in the National Museum of very various sizes:—

Specimens.	Dorsals.	Anal.	Caudal.	Pectoral.	Ventral.	Scales.			Length from Snout to tip of Caudal.	
						Along Lateral Line.	Above Lateral Line.	Below Lateral Line.	in.	lines.
1	9+16	3+10	19	16	1+5	54	7	17	13	0
2	9+18	3+ 9	20	16	1+5	49	7	18	10	6
3	9+16	3+10	21	16	1+5	55	7	17	19	0
4	9+16	3+10	20	16	1+5	53	7	17	15	9
5	9+16	3+10	20	15	1+5	52	6	18	8	3
6	9+17	3+10	20	16	1+5	56	7	16	24	0
7	9+15	3+10	20	16	1+5	53	6	16	5	0

REFERENCE.—*Centropristes truttaceus* (Cuv. and Val.), Hist. Nat. des Poiss., v. 3, p. 50, 1829. *Centropristes salar* (Richardson), Zool. Proc., 1838, Zool. Trans., v. 3, p. 78. *Centropristes Tasmanicus* (Hombr. and Jacq.), Voy. au Pole Sud Poiss., t. 4, f. 1. *(?) Perca trutta* (Cuv. and Val.), Hist. Nat. des Poiss., v. 4, p. 54. Perca marginata (Ka end of Ind

The genus *Arripis* of Jenyns was named from the absence of the usual fan of diverging ridges on the basal portion of the scales in his typical species the *A. Georgianus* (or Ruffy of the colonial fishermen); but it is slightly indicated by a few longitudinal ridges in our fish which is referable to the same genus. The two spines on the operculum, likewise noted by Jenyns in his type, although well marked in it, are almost entirely obsolete in the present fish, so that I have omitted them also from the generic character. The Ruffy (*A. Georgianus*) differs from the present fish, when specimens of the same size are compared, by its much coarser serration of the scales of the body, giving rise to the popular name, as the difference in roughness may be felt by the finger; also by the two distinct spines on the hind edge of the operculum; and by the last spines of the dorsal not being so much shorter than the next ray of the branched portion: the coloring also is greyer, and otherwise different in the *A. Georgianus,* as I will point out when figuring that species.

The adult condition of this fish, which is attained at about 2 feet in length, is improperly called "Salmon" by the colonists of the Victorian coasts, and is of a nearly uniform pale-olive color, without spots, paler on the lower half of the body. When about a foot in length it is popularly called "Salmon trout" by the fishermen and in the markets, and then differs from the adult in its smaller size, proportionately larger eyes, dark cloudy spots on the back, and the conspicuous rows of large round brass-like spots on the sides. All these characters I have many years ago proved to be merely characteristics of the younger stages of growth.

The *Centropristes truttaceus* of Cuvier was mainly characterized by the posterior edge of the preoperculum not being denticulated. This I have also proved by the demonstration of the characters in several specimens to be a character of the very young of the same species, with which it should, as well probably as the *Perca trutta* of Cuvier, be united. The very young when examined alive have

the caudal fin yellow with a black margin. These colors, however, fade quickly in spirit or on dried skins ; so this coloring, noted by Cuvier on a drawing from life, of a fish of which he had never seen a specimen, gave rise to his species *Perca marginata*, which, as all the other characters also are those of young *Arripis truttaceus*, I have proposed should likewise be considered a synonym of the present species ; thus reducing five supposed species of Victorian fish to one.

Nearly all the cases of fish-poisoning in Victoria are referable to this species. Some persons are under the impression that the bad consequences are due to incipient decomposition ; but I am certain that this is not always the case, as I have known several instances in which the effects were strongly marked after eating perfectly fresh examples, caught only an hour or so before cooking. It is curious that it is only at certain times and to certain people that this fish is more or less poisonous, while certainly good for food under other circumstances not yet understood. I have known three out of five people made seriously ill from eating at breakfast newly caught fish from one basket, and the two others felt no inconvenience whatever. The symptoms are, generally a few hours after eating, an extraordinary redness or flush of the skin, particularly of the face, often followed by an irruption, which soon passes away, with great derangement of the digestive organs, severe headache, vomiting, &c. Some cases of death have been reported, but, generally, the bad symptoms pass away in a few hours or days.*

The flesh has often a dull pinkish tinge, which may be one of the reasons for the popular application of the names "salmon" and "salmon trout" to this fish, not resembling the true salmon in any important respect.

The curvature of the back is rather greater than that of the abdomen in most specimens, especially of the younger ages. The dorsal and anal fins can be lowered into a groove at their bases. The swimming bladder is large, and of a delicate membranous texture. The pyloric appendages, which are counted as 17 to 50 by Dr. Günther, I find to be as many as 160 in several specimens.

* Dr. Youl, the City Coroner for many years, informs me that although he has seen many of these cases of fish-poisoning, the deaths reported were found by the jury to be due to other causes.

One of the most abundant of the food-fishes of Victoria in all the warmer months of the year, disappearing in the cold weather. It is not usually seen at the best tables, but is sold in great quantities by hawkers round the suburbs of Melbourne. The younger ages are very conspicuous in the fish shops by their yellow pectorals.

Explanation of Figures.

Plate 16.—Fig. 1, figure showing form and coloring of the adult at the age popularly called "Salmon," half the natural size. Fig. 1*a*, form of section in front of first dorsal. Fig. 1*b*, form of section of tail. Fig. 1*c*, one of the scales, natural size, showing the very fine ciliation of the free edge and the straight basal edge with the fine striation parallel to it, characteristic of the genus, but showing also a few longitudinal ridges. Fig. 1*d*, mouth, showing the arrangement of the various patches of villiform teeth on the jaws; those on the palate bones being marked *b*, and those on the vomer marked *c*; the tongue is marked *a*.

Plate 17.—Fig. 1, specimen two-thirds of natural size, showing form and coloring at the age popularly called "salmon trout." Fig. 1*a*, head, natural size, to show the disposition of the scales and the radiation and crenulated edge of the preoperculum. Fig. 1*b*, form of section in front of dorsal. Fig. 1*c*, scale from lateral line, magnified. Fig. 1*d*, scale from below lateral line, magnified.

Fig. 2, younger specimen, natural size, showing the form and coloring at the young age when the tail is yellow with the black margin, as in the *Perca marginata* of Cuvier. Fig. 2*a*, section of head through the eyes, showing the larger proportion of these than in the adult. Fig. 2*b*, form of section in front of dorsal. Fig. 2*c*, section of tail.

Frederick McCoy.

1
1a
1b
1c

PLATE 18.

TRACHURUS TRACHURUS (LIN. SP.).

THE HORSE MACKEREL.

[Genus TRACHURUS (CUV.). (Sub-kingd. Vertebrata. Class Pisces. Order Acanthopterygia. Fam. Carangidæ.)

Gen. Char.—Body moderately slender, compressed, fusiform, covered with small scales, except on the lateral line, which is set from anterior to posterior end with a series of large elliptical plates three or four times higher than long, each with a spine directed backwards near the middle. First dorsal fin less than half the length of the second, of one small anterior spine directed forwards, and eight slender spinous rays; second dorsal extending nearly to base of tail, of one spinous and many branched rays; anal, as long as the second dorsal, of two very short thick spines, forming a small fin in front of the remaining portion, of which the first slender ray is spinous, the rest branched; pectoral pointed; caudal deeply forked. Teeth minute on jaw, vomer, and palate bones. Branchiostegal rays seven; pseudobranchiæ; swimming-bladder forked behind.]

DESCRIPTION.—*Fin rays:* 1st dorsal of 8 spines, the third longest; 2nd dorsal scarcely separated from the anterior; 1st ray a slender spine, nearly twice the length of the last ray of the 1st dorsal and $\frac{2}{3}$ the length of the first of the 32 branched rays; anal, 2 short anterior spines only $\frac{1}{3}$ of the length of the slender one in front of the series of 28 branched rays; pectoral fin pointed, reaching to 3rd ray of 2nd dorsal, of 21 rays; ventral fin of 1 spinous and 5 branched rays; caudal fin of 15 rays, with 5 short rays above and 5 below those extending to the angles of the fin. *Scales:* along lateral line, 84; above, 10; below it, 16. *Form:* greatest depth of body, in front of 1st dorsal, about five times in length to middle edge of caudal fin; thickness there rather more than half the depth; section at tail rhombic, slightly wider than deep; diameter of eye slightly less than length of snout; length of head equal to length of pectoral, and $\frac{1}{4}$ of total length to middle edge of caudal fin; lateral line at about $\frac{1}{5}$ of the depth from the dorsal edge until end of 1st dorsal, then bending down and continuing about the middle of the side to the caudal. *Color:* back and upper part of sides olive bronze-green, freckled with darker; top of snout, base of pectoral, and round blotch at posterior angle of operculum brownish-black; lower part of cheeks, sides, and belly greyish-white, with brilliant iridescent reflections of pink, gold, and emerald-green; caudal fin pale-olive, with darker margin, and speckled with blackish; the other fins pale-greyish, speckled with blackish; iris golden-yellow above, silvery below.

REFERENCE.—*Scomber trachurus* (Lin.), Syst. Nat., 1, p. 494; Bloch, t. 56. *Caranx trachurus* (Cuv. & Val.), Hist. Poiss., v. 9, t. 246.

The following are the detailed measurements :—

Measurements.	Ins.	lines.
Length from snout to distal end of caudal	10	7
„ of caudal	1	8
„ from snout to anterior edge of orbit	0	9
, of eye	0	7
, of head to end of operculum	2	5
„ from snout to anus (measured along ventral edge) ...	4	8
„ from snout to base of pectoral	2	6
„ from snout to origin of 1st dorsal	3	0
„ of pectoral...	2	6
„ of 1st dorsal	1	5
„ of 2nd dorsal	3	7
„ of anal (including anterior spines)	3	5
„ of ventral	1	3
„ from snout to base of ventral	2	9
Width between eyes	0	7
Depth of body in front of dorsal	2	0
Thickness of body in front of dorsal	1	2
Height of 1st dorsal	1	3
Height of 2nd dorsal at highest anterior end	1	0

This is one of the few fishes of our coast identical with a European species. It is a very rare visitor. The specimen figured was caught in Hobson's Bay on the 3rd August.

EXPLANATION OF FIGURES.

PLATE 18.—Fig. 1, view, three-fourths the natural size, of the colors of the living fish Fig. 1*a*, spinous plate from lateral line, magnified 4 diameters. Fig. 1*b*, section in front of dorsal. Fig 1*c*, one of the scales above lateral line, magnified.

FREDERICK McCOY.

Pl. 19. (Fishes.)

Drawn by A. Bartholomew. Prof. M^c Coy. direct^t F. Schönfeld. lith.

PLATE 19.

LOTELLA CALLARIAS (GÜNTH.).

THE SMALL-SCALED ROCK COD.

[Genus LOTELLA (KAUP.). (Sub-kingd. Vertebrata. Class Pisces. Order Anacanthini. Fam. Gadidæ.)

Gen. Char.—Body moderately elongate, tapering from head. Caudal fin distinctly separated from the dorsal and anal. Two dorsal fins, the second much the larger. One anal fin, nearly equalling the second dorsal. Pectorals moderate, rounded. Ventral fin small, situated under the front of the pectoral with a flat base, with usually two long filamentous outer rays and a few shorter ones. Scales very small. Teeth forming a broad band of numerous rows in the upper jaw, with conspicuously larger ones in the outer row ; no teeth on the vomer or palatine bones. Branchiostegal rays, usually seven. Chin with a barbel.]

DESCRIPTION.—*Rays:* branchiostegal, 7 ; anal, 58 ; dorsals, anterior 5, posterior 63 ; ventral, 7 ; pectoral, 22 ; caudal, 28. *Scales:* along lateral line, 244 tubular, and about 10 beyond to base of caudal rays not pierced ; vertical scales, 33 above lateral line, from front of first dorsal, 77 below lateral line. *Color:* whole body and the scaly skin on base of dorsal, anal, pectoral, and caudal fins tawny-brown, becoming lighter towards the belly. Throat and lips pinkish flesh-color. The margin of the dorsal, ventral, and caudal fins purplish-black, below which the fins are purplish flesh-color, tinged with brown towards the base ; the anterior base of each scale is lighter than the margin. *Teeth:* exceedingly minute, except the larger conical teeth of the outer row, which are irregular in size, shape, and distribution ; about 7 or 8 on each side of upper jaw, and 10 or 12 on each side of lower jaw. *Fins:* ventral with a moderately narrow base, the two outer rays simple and extended into long filaments, the second longest nearly equalling the pectoral in length, and reaching more than halfway from its base to the vent ; the other five rays branched, and forming with the membrane the triangular fin rather more than half the length of the longest filament. The shorter first filament equal to half the length from base of pectoral to vent, and a little exceeding the barbel of the chin in length.

REFERENCE.—Ann. and Mag. Nat. Hist. Feb. 1863, p. 116.

The following are the dimensions of an average specimen :—

Measurements.	Ins.	lines.
Length from snout to distal end of caudal	22	0
„ of caudal	2	0
„ from snout to anterior edge of orbit	1	3
„ of orbit	0	9
„ of head to end of operculum	4	6
„ from snout to anus	8	0
„ from snout to base of pectoral	5	2
„ from snout to origin of first dorsal	5	3
„ of pectoral	2	10
„ of first dorsal	1	2
„ of second dorsal	12	4
„ of anal	10	6
„ of first ventral filament	1	9
„ of second ventral filament	2	7
„ of barbel	1	7
Width between eyes	1	0
Depth of body in front of dorsal	5	9
Thickness of body in front of dorsal	3	6
Height of first dorsal	1	7
Height of second dorsal at highest posterior end	1	6

This, like all the other species of *Lotella*, differs from the ordinary Rock Cod (*Pseudophysis*) in the comparatively large conical irregular outer row of teeth.

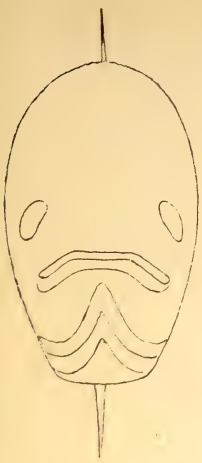
This fish is much rarer than the ordinary Rock Cod ; being caught however at the same time of the year, and in similar localities in Port Phillip Bay. It is easily distinguished, even without the characters of the mouth, by the more uniform brown color and very much smaller and more numerous scales. It is moderately good for the table, but not in much request.

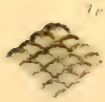
This species has not been figured before.

EXPLANATION OF FIGURES.

PLATE 19.—Fig. 1, ordinary specimen, one-third the natural size. Fig. 1*a*, line representing the greatest thickness of the fish, to same scale. Fig. 1*b*, mouth, natural size, showing the rows of small and larger teeth. Fig. 1*c*, scales from below pectoral fin, natural size.

FREDERICK McCOY.





Drawn by A. Bartholomew. Prof. M^c Coy direx^t F. Schönfeld lith.

PLATE 20.

PSEUDOPHYSIS BARBATUS (GÜNTH.).

THE AUSTRALIAN ROCK COD.

[Genus PSEUDOPHYSIS (Günth.). (Sub-kingd. Vertebrata. Class Pisces. Order Anacanthini. Fam. Gadidæ.)

Gen. Char.—Body moderately elongate, tapering from head; scales small, cycloid, loose; two dorsal fins; one anal fin. Ventral fins long, narrow at base; teeth in a band of several rows of equal small size (outer ones not larger than the others); no teeth on vomer or palate bones. Chin with a barbel. Confined to Australasia.]

DESCRIPTION.—*Rays:* branchiostegal, 7; anal, 44 to 57; dorsals, anterior 9 to 11, posterior 48 to 57; ventral, 5 to 6; pectoral, 22 to 26; caudal, 26 to 30. *Scales:* along lateral line, 116 to 128, of which about only 104 are tubular; vertical scales, 15 to 18 above lateral line, 31 to 47 below lateral line, from first dorsal. *Color:* whole body pale brownish-olive, the centre or basal part of the scales, on lower part of the sides, lighter and their edges minutely freckled, fading into pinkish-white on the throat and belly; slightly darker, and with slight purplish tinge on back, top of head, snout and lips; but the operculum silvery. Ventral fins pinkish-white, like the throat. Pectoral fin pale-purplish, with a large purplish-black spot at the upper part of its base. Dorsals, caudal, and anal fins purplish at base, with a dull orange tinge higher up, and with a narrow blackish-purple border; the lower portion of each fin is covered nearly up to the margin by very small olive scales on a loose skin. *Teeth:* small, short, hooked, subequal, forming a broad band on each side in each jaw, about 4 or 5 rows in width in each patch, and about 78 above and 48 below in length; the lower teeth a little larger than the upper. A large double oval patch of pharyngeal teeth, as large as those of the jaws, on each side. *Fins:* ventral fin with rather narrow base, only the first two rays simple, prolonged into filaments, the second longest, the first about as long as the pectoral, and reaching less than half way from its base to the anus; the other three rays branched, and forming, with the membrane, the triangular fin, less than half the length of the filaments.

REFERENCE.—Ann. and Mag. Nat. Hist. Feb. 1863, p. 116.

The following are the dimensions of a rather large specimen :—

Measurements.	Ins.	lines.
Length from snout to distal end of caudal	17	6
„ of caudal	1	5
„ from snout to anterior edge of orbit	1	$3\frac{1}{2}$
„ of orbit	0	9
„ of head to end of operculum	3	8
„ from snout to anus (measured along ventral edge) ...	6	8
„ from snout to base of pectoral	4	3
„ from snout to origin of first dorsal	4	10
„ of pectoral	1	9
„ of first dorsal	1	6
„ of second dorsal	8	8
„ of anal	8	6
„ of second ventral filament	2	3
* „ of barbel	0	11
Width between eyes	1	3
Depth of body in front of dorsal	4	9
Thickness of body in front of dorsal	2	10
Height of first dorsal	1	3
Height of second dorsal at highest posterior end	1	3

* In females of about the same size the barbel is only about 5 lines long, and the longest ventral filament 1 inch 8 lines. In some specimens the barbel is only 3 lines long.

To show the singular variability of the fin rays in this species, I subjoin particulars of six specimens in the National Museum, all about the same size, and agreeing in other respects :—

Specimens.	Fin Rays.					Scales.		
	Dorsals.	Anals.	Caudal.	Pectoral.	Ventral.	Along Lateral Line.	Above Lateral Line.	Below Lateral Line.
Specimen drawn ...	9+57	56	30	26	5	124	18	47
Two stuffed	9+54	57	26	23	5	119	15	31
	10+52	54	28	22	5	116	15	36
Three in spirit	9+48	44	29	25	5	122	17	41
	10+51	47	27	24	6	124	16	40
	11+48	52	28	24	5	128	15	38

The species of *Pseudophysis* are distinguished from those of the very similar genus *Lotella* by the outer teeth being no larger than those of the inner rows.

This fish, not having been figured before, may "point a moral and adorn a tale" *apropos* of the utility of having our colonial fishes accurately figured and described for reference. I was called upon soon after arriving in the colony to assist at a grand dinner in the old Criterion Hotel of "merchants, bankers, and others," who had been brought together to taste this fish, to satisfy themselves it was a real Newfoundland cod, a bank of which had been discovered in Victorian waters by fishermen—practical men—who proposed to give the assembled gentlemen and their friends the opportunity of subscribing so many thousands for a fleet of boats, so many thousands for curing establishments on land, so much to the discoverers, &c., to form a cod-fishing company. The small size of the cooked fish and its inferior flavor was explained by the discoverers having been so ill provided that they could only catch a few very young ones. The statistics of the Newfoundland cod fisheries were quoted to show the great profit which would arise from this investment, and all went well, until one of the guests, who shall be nameless, earned great unpopularity by giving some reason for believing that the samples, 16 or 17 inches long, were not young, but adult ; and referring to the title of Sam Slick's new book at the time, "How many Fins has a Cod ?" showed that, as the real cod had three

dorsal fins and two anal ones, and that the Victorian fish in question had only two dorsals and one anal, they could not be even of the same genus, and that no arguments based on the identity with the true cod could be relied upon for the commercial speculation. The project collapsed ; and although none of the capitalists willing to invest in the matter then knew "how many fins had a cod," the figure now given will settle the identity of our fish for the future.

This species seems to vary more than usual in the number of the fin rays, some of our specimens having more and some less than in Dr. Günther's type. The very much smaller and more numerous scales readily distinguish it from the New Zealand *Pseudophysis breviusculus.*

The abdomen between the throat and anal fin is very prominent, owing to the unusually large size of the liver.

Caught commonly with a line all the colder months of the year in Port Philip Bay on rocky reefs in five or six fathoms water. It is sold in the markets commonly for the table, but the flesh is soft and not very good. The fishermen report the spawning time to be in April.

Explanation of Figures.

Plate 20.—Fig. 1, view of ordinary specimen, three-eighths the natural size, of the colors of the living fish. Fig. 1*a*, form of section. Fig. 1*b*, rows of small equal teeth on the jaws and teeth on back of tongue. Fig. 1*c*, scales from below lateral line behind pectoral fin, natural size.

Frederick McCoy.

By Authority: John Ferres, Government Printer.

Natural History of Victoria.

PRODROMUS

OF THE

ZOOLOGY OF VICTORIA;

OR,

FIGURES AND DESCRIPTIONS OF THE LIVING SPECIES OF ALL CLASSES

OF THE

VICTORIAN INDIGENOUS ANIMALS.

DECADE III.

BY

FREDERICK McCOY,

HONORARY FELLOW OF THE CAMBRIDGE PHILOSOPHICAL SOCIETY; HONORARY ACTIVE MEMBER OF THE IMPERIAL SOCIETY OF NATURALISTS OF MOSCOW; CORRESPONDING MEMBER OF THE ZOOLOGICAL SOCIETY OF LONDON; HONORARY MEMBER OF SEVERAL OTHER SCIENTIFIC SOCIETIES, ETC.
PROFESSOR OF NATURAL SCIENCE IN THE MELBOURNE UNIVERSITY.
DIRECTOR OF THE NATIONAL MUSEUM OF NATURAL HISTORY AND GEOLOGY OF MELBOURNE, ETC.

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MDCCCLXXIX.

PREFACE.

It having been considered desirable to ascertain accurately the natural productions of the Colony of Victoria, and to publish works descriptive of them, on the plan of those issued by the Governments of the different States of America, investigations were undertaken, by order of the Victorian Government, to determine the Geology, Botany, and Zoology of the Colony, to form collections illustrative of each for the public use, and to make the necessary preparations for such systematic publications on the subject as might be useful and interesting to the general public, and contribute to the advancement of science.

As the geological and botanical investigations have already approached completion, and their publication is far advanced, it has been decided to now commence the publication of the third branch completing the subject, namely, that of the Zoology or indigenous members of the different classes of the animal kingdom.

As the Fauna is not so well known as the Flora, it was a necessary preliminary to the publication to have a large number of drawings made, as opportunity arose, from the living or fresh examples of many species of reptiles, fish, and the lower animals, which lose their natural appearance shortly after death, and the true characters of many of which were consequently as yet unknown, as they had only been described from preserved specimens. A Prodromus, or preliminary issue, in the form of Decades or numbers of ten plates, each with its complete descriptive letterpress, will be published, of such illustrations as are ready, without systematic order or waiting for the completion of any one branch. The many good observers

in the country will thus have the means of accurately identifying various natural objects, their obsrvations on which, if recorded and sent to the National Museum, where the originals of all the figures and descriptions are preserved, will be duly acknowledged, and will materially help in the preparation of the final systematic volume to be published for each class when it approaches completion.

This third Decade gives figures and descriptions in the first plate of the largest species of Seal, the Sea-Leopard, occurring on our coasts.

The second plate represents another marine mammal, the yellow-sided Dolphin, or Bottle-nose of sailors, occasionally following shoals of fish into Hobson's Bay.

The third plate shows the characters of three species of dangerous, poisonous snakes, hitherto confounded under the name of "Brown Snake." One of these is the large deadly "Common Brown Snake;" of the other two, not before figured or described, one is distinguished by the much smaller scales, in more numerous rows, across the neck and back; while the third is marked by the great size of the rostral shield covering the anterior part of the head; all three being equally large and venomous.

The fourth plate represents the seventeen Victorian species of the beautiful genus *Catenicella*, which may almost be looked on as characteristic of the Australian seas, from the number of species and abundance of individuals of these exquisite objects for microscopic observation occurring in Australasian waters, and the fact that comparatively few are found elsewhere.

The fifth and sixth plates give illustrations of all the known Victorian species of *Membranipora*, another genus of the same order, *Polyzoa*, of minute, beautiful objects, really allied to the *Mollusca*, but often popularly called Lace-Corals, from their delicate tracery and a mistaken notion of their affinities. The *Polyzoa* abound in the fossil state in our Tertiary rocks, and the publication

of the species now living on our coasts is a necessary preliminary to the study by the geologist of the extinct ones in various strata. I am greatly indebted to one of the most distinguished investigators of these animals, my friend Dr. MacGillivray, of Sandhurst, for presenting specimens of all the native species of these two genera to the National Museum collection, and placing at my disposal the whole of his descriptive and critical notes for the purposes of this publication. The lithographic figures will, I hope, be found to be perfectly efficient for the distinction of the species ; I have at least spared no trouble to make them so.

The seventh plate represents two interesting fishes not figured before, one a marine species commonly called Australian Rockling, and the other the most popular of the freshwater fishes of the Yarra and its tributaries, the Yarra Blackfish, a new species of the extraordinary genus *Gadopsis*, which seems to combine the characters of the two great systematic groups of Fishes, the *Acanthopterygii* and the *Malacopterygii*, or *Anacanthini.*

The eighth plate shows the characters of a Mackerel with a swim-bladder, occasionally appearing in Hobson's Bay, which I believe to be identical with the Southern or Spanish Mackerel of Europe.

The ninth plate represents a fresh-water Crayfish of the genus *Astacoides,* abounding in swamps and waterholes from Melbourne, on the south, to the Murray flats, on the north extremity of the colony. This is commonly called Yabber or Yabbie, and is highly praised as an article of food by some, and spoken of bitterly by others, from the mischief it does in boring through the banks of water-dams.

The tenth plate represents the largest-bodied of our Lepidopterous insects, the gigantic Wattle Goat-moth, the larva of which is very destructive to the Wattle or Acacia trees, so valuable for their tanner's bark, by boring great holes in the timber, on which they

feed ; these larvæ, three-quarters of an inch in diameter and five inches long, forming a succulent and most delicious *bonne bouche* for the natives.

The succeeding Decades will illustrate as many different genera as possible, and will deal first usually with species of some special interest, and of which good figures do not exist, or are not easily accessible.

FREDERICK McCOY.

10th March 1879.

1
1b
1a
1c
1d
1e

PLATE 21.

STENORHYNCHUS LEPTONYX (DE BLAINV. SP.).

THE SEA-LEOPARD SEAL.

[Genus STENORHYNCHUS (F. CUV.). (Sub-kingd. Vertebrata. Class Mammalia. Order Pinnipedia. Fam. Phocidæ.)

Gen. Char.—Dental formula:—*i.*, $\frac{2-2}{2-2}$; *c.*, $\frac{1-1}{1-1}$; *m.*, $\frac{5-5}{5-5}$ = 32. Incisors conical; outer upper ones largest and resembling the canines. Molars compressed with the crown, divided into three long, narrow, conical lobes, the middle one largest; the anterior molar in each jaw with one root, the others double-rooted. Muzzle compressed, elongated, broad, simple, hairy. Whiskers small, wavy, tapering; no external ears; fore feet triangular; wrist very short; hind feet of two nearly equal lobes; three middle toes small; claws of anterior limbs small; of posterior ones obsolete. Skull elongate, orbits moderate; lower jaw strong, with an acute angle behind; fur close-set, short, of flat, tapering hairs; without under fur.]

DESCRIPTION.—Length of adult male about 10 feet. *Color:* above yellowish light ashy-grey, with numerous, irregular, large spots, or small irregular patches, of dull yellowish-white, and darker grey spots on the sides of the neck and body, with occasional, smaller, irregular, black spots, and a few smaller, whitish spots on the sides of the body; upper part of hind limbs dark-grey, irregularly marbled with lighter patches and spots, and dark-brown, large patches and streaks, darkest on the margins. Anterior limb, or pectoral, with the anterior margin marked with dark-brown patches; the posterior portion dark-grey. Iris blackish-brown. Throat, belly, and lower portion of sides dull yellowish-white with a few small blackish spots. Lips black.

MEASUREMENTS OF TWO SPECIMENS IN MUSEUM.

	Large.		Small.	
	ft.	ins.	ft.	ins.
Length from tip of snout to extremity of tail	9	7	6	3¼
„ from tip of snout to occiput	1	3	1	0
„ from tip of snout to front of pectoral	3	5	2	4
„ from tip of snout to eye	0	6¼	0	6
„ of pectoral	1	8	1	1½

REFERENCE.—*Phoca leptonyx* (de Blainville), Journ. Phys. xci., 288, 1820= *Stenorhynchus leptonyx* (F. Cuvier), Dict. Sc. Nat. xxxix., 549, t. 44.

This, the largest of the Seals frequenting our coast, is a most voracious devourer of fish and occasionally of marine birds. It is a good example of the group of genera termed "Earless Seals," from their having no external ear-conch visible. Unlike the Eared Seals, the hind limbs are directed backwards when at rest, nearly

in a line with the body, and closely approximated to the tail, with only a moderate, obliquely lateral, power of motion; so that, on the land, instead of raising the body clear of the ground and walking on the four legs like the eared seals, it can only progress painfully on the land by the action of the abdominal muscles and singularly flexible spine. Dr. Ludwig Becker (who died in the Burke and Wills Expedition across the Australian Continent), when making the drawing for our plate from a living specimen, wrote thus to me on this point :—" The specimen while alive was able to open its mouth so much that the upper and lower jaw formed an angle of nearly eighty degrees. Palate and tongue pale flesh-color. The flexibility of the spine was seen while the poor animal was crying either from pain or for food ; it could raise the head two feet and a half from the floor while still the sternum was level with the belly, and the head when raised was bent backwards. At the same time the spine from above the pelvis to the tail moved right and left. The sound was somewhat between a roaring and a grunting noise, not very strong."

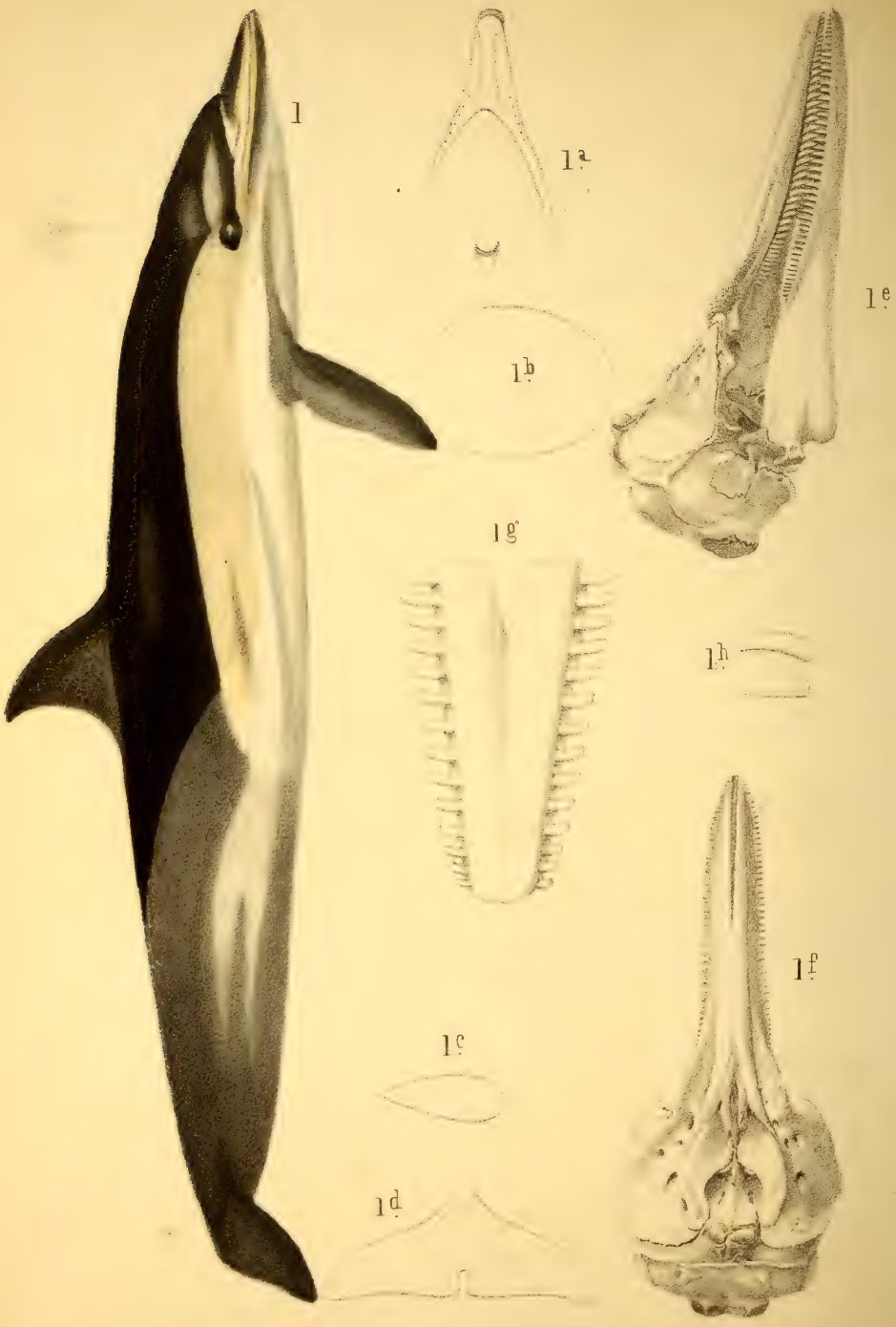
This species abounds in countless myriads on the packed ice of the Antarctic Ocean, and only occurs on our shores as an occasional visitant strayed from its usual haunts.

Fine specimens from the Victorian coasts are in the National Museum.

EXPLANATION OF FIGURES.

PLATE 21.—Fig. 1, specimen, of average color, when at rest, viewed from the side, one-twelfth the natural size. Fig. 1*a*, side view of skull, one-sixth the natural size. Fig. 1*b*, front view of same, one-sixth the natural size. Fig 1*c*, half of palate, showing proportion and position of teeth, and the palatal vacuity ; reduced one-half. Fig. 1*d*, similar view of teeth of lower jaw. Fig. 1*e*, third molar, lower jaw, natural size.

FREDERICK McCOY.



F. Schönfeld lith. *Prof. M^c Coy, direx^t* *Hamel & C^o imp.*

PLATE 22.

DELPHINUS NOVÆ ZEALANDIÆ (QUOY AND GAIM.).

THE YELLOW-SIDED DOLPHIN.

[Genus DELPHINUS (LIN. as restricted by GRAY). (Sub-kingd. Vertebrata. Class Mammalia. Order Cetacea. Fam. Delphinidæ.)

Head and forehead rounded, with a suddenly narrowed beak in front, separated by a transverse groove from the head. Dorsal fin falcate, in middle of back. Pectoral fin elongate, falcate. Skull with hind wings of maxilla horizontal; nose much longer than the head, tapering, depressed in front, wider than high, nearly parallel-sided, convex above, slightly concave in front of blow-hole. Teeth subequal, pointed, incurved, $\frac{40 \cdot 40}{40 \cdot 40}$ to $\frac{60 \cdot 60}{60 \cdot 60}$, extending along greater part of the length of each jaw.]

DESCRIPTION. — *Teeth:* $\frac{45 \cdot 45}{44 \cdot 44}$. Body rounded in front, tapering behind, becoming much compressed and carinated above from about half-way between the end of the dorsal and the caudal fins; snout, narrow cylindrical, depressed above, pointed in front. *Color:* upper part of body glossy rich black as far as half-way between dorsal fin and tail, beyond which the posterior part of the body is dark slate-color; edge of upper jaw, lower jaw, and belly dull-whitish; pectorals blackish above, whitish below; dorsal dull-whitish or leaden-grey in middle, the margins darker; eye moderate, dark-brown, surrounded with a black margin extending as a narrow streak forwards to join the black of the head, at front of triangular groove; the upper and lower edges of this black mark being margined with white. A large, wide, dull yellow-ochre colored patch extends on each side from the eye backwards nearly as far as the hind edges of dorsal, widening on middle of side and then tapering to posterior end. Skull.—Palate deeply concave along each side behind, middle very prominent.

MEASUREMENTS OF MODERATE-SIZED SPECIMEN.

	Ft.	ins.
Length from tip of lower jaw to centre of tail	5	1½
„ from tip of snout to anterior edge of blower	1	0
„ from tip of snout to anterior point of triangular furrow in front of forehead	0	4¾
„ from tip of snout to eye	0	10¼
Girth behind pectorals...	2	3½
Length from tip of snout to front of pectoral	1	4¾
„ from tip of snout to front of dorsal	2	4½
„ of pectoral	0	9
Greatest width of pectoral	0	3
Height of dorsal along front edge	0	8
Length along base of dorsal	0	6½
Width of tail	1	0
Length of skull from condyles to tip of snout	1	5½
Lower jaw projecting 4 lines beyond upper jaw—		
Length of lower jaw	1	2¾
„ of dental series of lower jaw	0	8½
„ from tip of snout to anterior edge of blowers on skull...	1	0½

REFERENCE.—Quoy and Gaimard, Voyage de l'Astrolabe.—Pl. 28, f. 1.

This is the only Dolphin, or "Bottle-nose," as sailors say, which I have noticed on the Victorian coasts. It not unfrequently visits Hobson's Bay, generally in August, and following shoals of Pilchards or other fish, on which it feeds.

EXPLANATION OF FIGURES.

PLATE 22.—Fig. 1, side view, natural colors, reduced; the position of the blowers marked by the spouting. Fig. 1*a*, view of forehead and snout from above. Fig. 1*b*, form of section behind pectorals. Fig. 1*c*, form of section near tail, showing the compressed, sharp, upper mid-line. Fig. 1*d*, form of tail, viewed from above. Fig. 1*e*, side view of skull, reduced. Fig. 1*f*, skull, seen from below, showing the deep concave channel on each side of the narrow, prominent palate. Fig. 1*g*, extremity of lower jaw, viewed from above, natural size, showing length of symphyses and size and position of teeth. Fig. 1*h*, tooth from middle of jaw, natural size, viewed in front and profile.

FREDERICK McCOY.

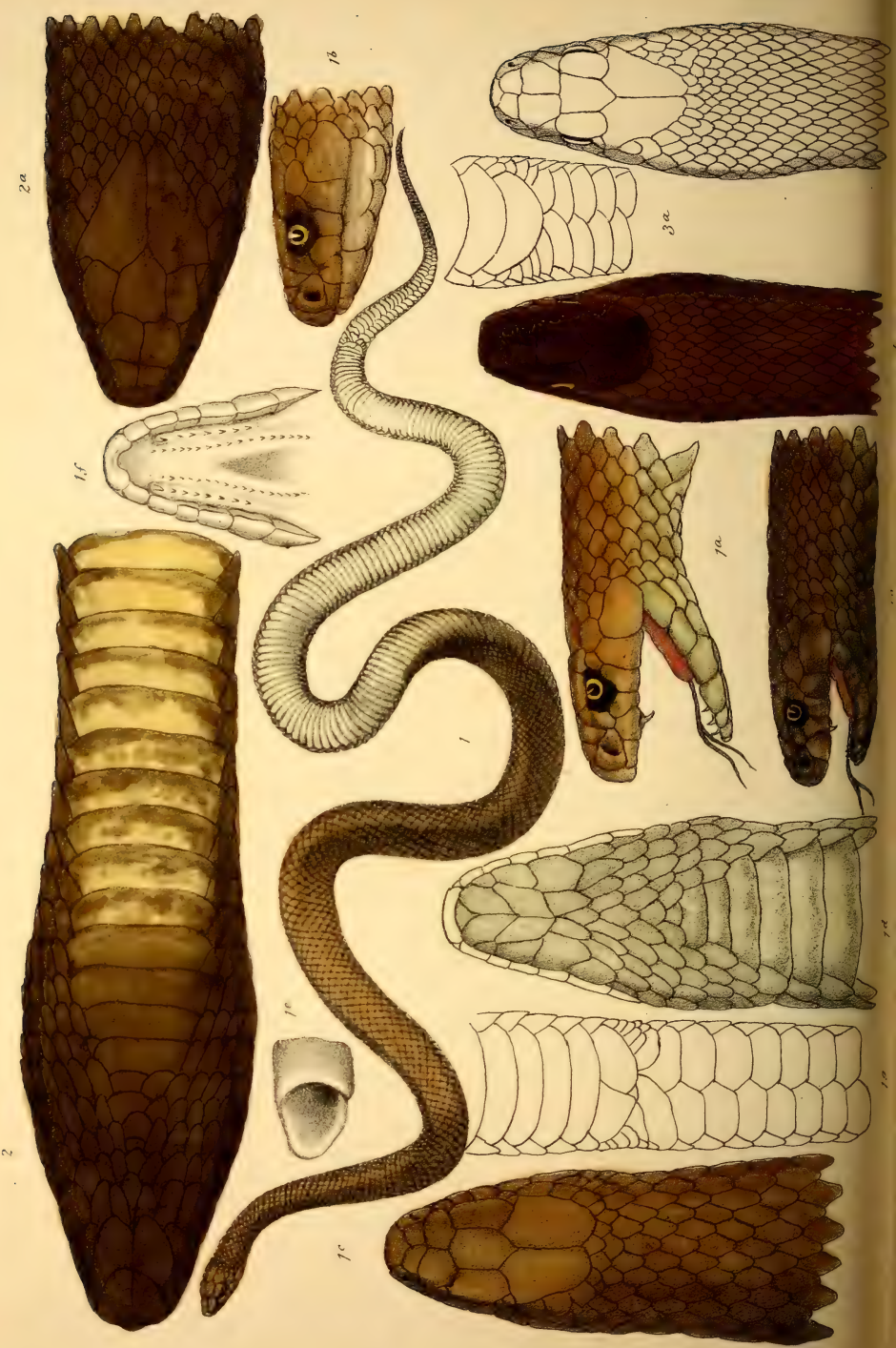

2a
1b
3a
1f
7a
1
1e
2
1c
1d
1g

PLATE 23, FIG. 1.

DIEMENIA SUPERCILIOSA (FISCHER).

THE COMMON BROWN SNAKE.

[Genus DIEMENIA (GRAY). (Sub-kingd. Vertebrata. Class Reptilia. Order Ophidia. Fam. Elapsidæ.)

Gen. Char.—Body and tail moderately stout; head subquadrate, muzzle blunt. *Plates:* rostral moderate, vertex plate narrow; loreal replaced by deflected posterior frontal, anterior ocular, second labial, and posterior nasal; oculars one, sometimes two, anterior, and two posterior; two nasals with nostril between them. Scales smooth, 15 or 17 rows on back; subcaudals in two rows. A row of small, equal, solid teeth behind the grooved fang. Australasia and New Guinea.]

DESCRIPTION.—*Form:* body moderately stout, cylindrical; head only moderately exceeding the width of the neck, flat above, sides nearly vertical, converging to a narrow, rounded, blunt muzzle. *Scales:* 17 rows of scales across middle of back, large, flat, rhombic, and smooth; ventral plates, 190 to 216; subcaudals, 57 to 73; anal plate double. *Plates:* rostral shield one-fourth broader at base than high, obtuse-angled behind; anterior frontals small, quadrangular, nearly twice as wide as long; posterior frontals nearly twice the length of the anterior ones; vertex plate hexagonal, anterior angle so obtuse as to be scarcely marked, the length equalling the inner sides of the anterior and posterior frontals, the width in front nearly twice the width behind, or about two-thirds of the length. Parietal and occipital shields moderate. *Color:* color of head and upper part of body and tail nearly uniform olive-brown or warm sepia, with a slight bronze reflection; the lower surface of a lighter tint of pale yellowish-grey, the edges of the scales darker colored, with a glassy lustre; the anterior part of the belly freckled with pale-brownish spots, the hinder part dotted with grey; eyes black, with a yellow line round pupil; skin between the scales greyish. *Teeth:* 17 small, solid, equal palatine teeth on the left side, and 18 on the right in the specimen (Fig. 1); 6 small solid teeth behind the fang on the left side, and 7 on the right in same specimen.

The following are the numbers of scales in seven specimens counted in the Museum collection:—

Specimens.	Scales of Back.		Plates.		Length.	
	Across Middle.	Over Base of Tail.	Abdomen.	Tail.	Total.	Tail.
					ft. ins.	ins.
1. Young, S. Brighton ...	17	15	190	46·46*	1 10	3¼
2. Average sp., Heidelberg...	17	14	204	57·57†	4 3	7½
3. Queenscliff	17	15	197	63·63‡	5 6	11
4. Murray Downs	17	14	200	57·57	3 6	6½
5. Sebastian, Sandhurst ...	17	15	201	73·73	3 6	7
6. Footscray	17	14	206	60·60§	4 5	9
7. Figured Pl. 23, fig. 1 ...	17	15	202	62·62	5 2	9¼

* Third and fourth subcaudal plates single. † Tip of tail absent. ‡ Four first single.
§ Second, third, fourth, and fifth single.

REFERENCE.—*Pseudoelaps superciliosus* (Fischer), Abhandlungen aus dem Gebiete der Naturwissenschaften, h. v. d., naturwissenschaftlichen Verein in Hamburg; vol. 3, t. 2, f. 3.

This is one of the largest of the poisonous and very dangerous snakes of the colony, and is more generally distributed than any of the others, being equally common from the south coast to our northern Murray boundary. In the experiments made by Dr. Halford on snake-poisoning, tabulated in the *Medical Society's Journal* for March 1875, all the cases of people bitten by the Brown Snake and treated by the injection of ammonia recovered; but in one of the last cases mentioned in the public journals (*Bendigo Advertiser,* 27th October 1877), a snake of this species, 3 feet 6 inches long (the fifth in above table of measurements), bit Mrs. Eleanor Ingleby, residing at Sebastian, in the hand, and she died from the effects within fifty minutes. The acting coroner, Mr. Strickland, who held the inquest, sent the specimen to the Museum, where it is now deposited, so that the species is determined with certainty.

EXPLANATION OF FIGURES.

PLATE 23.—Fig. 1, average specimen, one-fifth the natural size. Fig. 1*a*, side view of head, natural size (the groove in front of the eye not sufficiently shaded to indicate the projection of the eyebrow and apparent division of the first ocular). Fig. 1*b*, same, with mouth closed, groove in front of the eye not sufficiently shaded. Fig. 1*c*, view of the top of the head, natural size, to show the form and disposition of the plates. Fig. 1*d*, same viewed from below. Fig. 1*e*, nasal plates with nostril. Fig. 1*f*, inside of palate of same specimen, natural size, showing the two small fangs with the row of smaller solid teeth behind on each side, and the two palatine rows of small, solid teeth.

PLATE 23, FIGS. 2 AND 3.

DIEMENIA MICROLEPIDOTA (McCOY).

SMALL-SCALED BROWN SNAKE.

DESCRIPTION.—General appearance of *D. superciliosa* and with a similarly small rostral plate; but the vertex plate is nearly pentagonal, from the broad front being almost destitute of angle, forming the greatest width of the plate, which is three-fourths of its total length, the sides converging backwards to the narrow posterior end; posterior frontals proportionally much more elongate, more than twice the length of the anterior frontals, and the occipital plates much narrower behind. The scales are also much smaller and more numerous, being 30 or 36

across the neck, 23 across the middle, and 17 over base of tail. The ventral scales are also more numerous, being from 232 to 237, the anal one being undivided, while the subcaudals are only 61 to 66. *Color:* dark-brown above, yellowish-grey below, the ventral scales edged and blotched with dark-grey; one specimen with the head sooty-black gradually passing into blackish-brown on the body and tail. The general size is larger than the Common Brown Snake.

This large well-marked species is only found in the warmer northern parts of the colony. It is very easily distinguished from the Common Brown Snake (*D. superciliosa*) by the greater number of rows of scales across the back, and their obviously much smaller size and greater number, particularly across the neck. The two type specimens in the Museum have the following dimensions and numbers of scales :—

Specimens.	Scales of Back.		Plates.		Length.	
	Across Middle.	Over Base of Tail.	Abdomen.	Tail.	Total.	Tail.
					ft. ins.	ins.
Pale-brown sp.	23	17	237	66·66	4 9	7½
Large blackish-brown sp.	23	17	232	61·61	6 1	10

Locality, junction of Murray and Darling.

Explanation of Figures.

Plate 23.—Fig. 2, under side of head and neck, natural size, of large dark specimen. Fig. 2*a*, upper side of head of same specimen, showing the long posterior frontals, the broad-fronted, nearly pentagonal vertex plate, and the narrow occipital plates converging to the wedge-shaped posterior end. Fig. 3, head of smaller specimen, natural size, showing also the long posterior frontals, broad-fronted pentagonal vertex plate, and wedge-shaped posterior narrowing of the occipitals; as well as the smaller and more numerous scales when compared with fig. 1*c*, showing head, of nearly the same size, of *D. superciliosa*. Fig. 3*a*, under side of base of tail of same specimen, natural size, showing the undivided anal plate.

Plate 23, Fig. 4.

DIEMENIA ASPIDORHYNCHA (McCoy).

The Shield-fronted Brown Snake.

Description.—General appearance of *D. superciliosa*, but the head narrower, and with the front of the muzzle truncated instead of being rounded; and with a very much larger rostral plate extending backwards over the top of the head more than

twice as far relatively as the rostral shield of *D. superciliosa* or *D. microlepidota*, equalling in backward extension the anterior and posterior frontals together. The posterior frontals are but little longer than the anterior ones, contrasting in this respect strongly with *D. microlepidota*. The vertex plate has the pentagonal form, broad front, and backward-converging sides of *D. microlepidota*, but is shorter and more obtuse-angled behind, contrasting with the angular front and parallel sides of the hexagonal, vertex plate of *D. superciliosa*. The occipital plates agree with *D. superciliosa* in being shorter, broader, and widely rounded behind, contrasting in this respect with *D. microlepidota*. *Color:* a dark, rich, warm sepia-brown above, dark-greyish below, with lighter edges to scales; plated part of head very dark-brown or brownish-black. *Scales:* moderate, 24 or 20 across neck, 17 across middle of back, 15 over base of tail; abdominal scales, 219, anal scale divided; sub-caudals, 55 on each side. *Teeth:* 16 in each palatine row; 7 on one side and 4 on the other behind the fangs. The anterior grooved ocular plate often appearing (erroneously) divided into two. Length: total, 4 feet 8 inches; tail, 8 inches.

In the enormous size of the rostral shield, its great backward extension over the crown, and in the size and shape of the frontals and vertex plate, this species agrees with the *Pseudonaja nuchalis* of Günther, but it is not banded, and presents no generic difference from the other two Brown Snakes above described, and certainly belongs to the genus *Diemenia*.

Explanation of Figures.

Plate 23.—Fig. 4, head, natural size, viewed from above. Fig. 4*a*, side view of same specimen.

Frederick McCoy.

E. Gilks del. et lith. Prof. M^c Coy, direx^t J. M. Ferguson imp.

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PLATES 24, 25, 26.

POLYZOA.

The number of observers with the microscope is so considerable in Victoria that it seemed to me particularly desirable to take advantage of the microscopic skill and powers of observation of some of my friends to present the means of readily identifying some of the more easily preserved, beautiful, and interesting of the minute members of the animal kingdom found in the colony. From the *Polyzoa* presenting these recommendations in a high degree, and an exact determination of our living species being likewise of great prospective interest to the geologist, as a necessary preliminary to the right understanding of the numerous species occurring in our Tertiary formations, I several years ago mentioned to my friend Mr. P. H. MacGillivray, so well known for his studies of this group, my desire to publish in this work all that were known on our shores; and I have to express my greatest thanks to him for immediately presenting a series of his specimens to the National Museum, and furnishing me with his notes on them. The specimens I have had most carefully figured, the three following plates giving the species of the genera *Catenicella* and *Membranipora*, represented in all the views that seemed needful for the easy and certain recognition of the species.

PLATE 24, FIG. 1.

CATENICELLA MARGARITACEA (BUSK).

[Genus CATENICELLA (BLAINV.). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-Order Cheilostomata. Fam. Catenicellidæ.)

Gen. Char.—"Cells arising one from the upper and back part of another by a short corneous tube, all facing the same way and forming dichotomously divided branches, of an erect phytoid polyzoary; cell at each bifurcation geminate; each cell with two lateral processes, usually supporting an avicularium. Ovicells either subglobose and terminal, or galeriform, and placed below the opening of a cell in front." The species of *Catenicella* abound in the Australasian seas, to which they are almost confined.]

Description.—Cells widely ovate. Fenestræ 5. Lower lip with a minute rounded notch. Lateral processes large; avicularium large, supporting a widely-open cup-shaped process above. Back of cell finely sulcated.

Reference.—Busk, Voy. Ratt., i., 356; Cat. Mar. Pol. Brit. Mus., t. 6, f. 1, 2, 3.

Forms dense tufts, 2 to 4 or 5 inches high, of a reddish-brown color; common on the Victorian coasts.

This species is readily distinguished by the number of the fenestræ, the slight notch in the lower lip, the form of the lateral processes, with the widely-open, superior, cup-shaped, chamber, and the sulci on the back of the cells.

Explanation of Figures.

Plate 24.—Fig. 1, natural size. Fig. 1*a*, front view of a branchlet, magnified. Fig. 1*b*, back view of ovicell, magnified. Fig. 1*c*, front view of ovicell, magnified. Fig. 1*d*, back view of a branchlet, magnified.

The species of this genus may be divided into five well-defined groups. The first, *Fenestratæ** of Busk, is distinguished by the presence of a certain number of marks or fenestræ on the front of the cell, caused by the deficiency of the ectoderm at these points. The species are mostly of large size, and the ovicells are large and terminal. In the second group, *Vittatæ*† of Busk, there are no fenestræ, but there is a narrow lateral or sublateral band or vitta on each side. The ovicells are of two forms, either on the summit of a cell of a series and cemented to the succeeding one, which is sessile, so that the three form a continuous mass; or they are terminal, and situated on the summit of a cell of a geminate pair. They are usually small species. The third group, *Simplices* of Busk, comprising the single species *C. carinata*, has neither fenestræ, vittæ, nor any other appendage, except the peculiar transversely spreading lateral processes. The fourth group, *Auritæ*‡ of Wyville Thomson, has neither true fenestræ nor vittæ, and is distinguished oy the presence of several thick blunt hollow processes on the upper edge of the mouth. The fifth group, *Fasciatæ* of Thomson, consists of the single species *C. Harveyi*.

* *Fenestratæ* includes *C. margaritacea, plagiostoma, ventricosa, hastata, rufa, cribraria, alata, lorica, intermedia.*

† *Vittatæ* includes *C. formosa, elegans, perforata, Buskii, Hannafordi, crystallina, cornuta.*

‡ *Auritæ* includes *C. aurita, geminata.*

The lateral processes, the characteristics of which are largely used in the discrimination of the species, can, in many, be seen to consist of three divisions, the middle one being the true avicularian chamber. One or more of the divisions may be largely developed, abortive, or wanting.

In addition to the species here described, *C. amphora* and *umbonata* of Busk, and *castanea* and *Harveyi* of Thomson—which have been found in Bass's Straits—are certain to occur on our coasts; and there is no doubt that a careful search will add several undescribed forms to the list.

PLATE 24, FIG. 2.

CATENICELLA PLAGIOSTOMA (BUSK).

DESCRIPTION.—Cells large, wide. Fenestræ 5, very large. Mouth lofty, directed obliquely to one side of the cell. Lateral processes very wide, consisting of an avicularium surmounted by a wide hollow fringe. Avicularia of two sorts, of moderate size, or very much elongated and exceeding half the length of the cell. The back of the cell with a broad longitudinal band, from which proceed, on either side, two narrow bands, one to the avicularian process, the other across the middle of the cell. Ovicell very large.

Var. *α lævis.*—Back of cell destitute of spines.

Var. *β setigera.*—Back of cell with small setose spines in the intervals between the dorsal band and its branches.

REFERENCE.—Busk, Voy. Ratt., i., 358; Cat. Mar. Pol. Brit. Mus., t. 5, f. 1, 2.

Very common, forming handsome, dense, reddish tufts, 3 or 4 inches high.

This is one of the most peculiar species of the genus. The cells are very broad, the front almost entirely occupied by 5 fenestræ, the real nature of which is here probably better shown than in any other species. The marks on the back of the cell are produced in the same manner as the fenestræ in front, the broad mesial and the narrow diverging bands consisting of the ectoderm which is deficient in the other parts, as it is in the fenestræ in front. The mouth of the cell is very lofty and directed obliquely to one side, which is constant in all the cells of the same series, and follows the same direction as that of the geminate cell from which

it arises—the mouths of the geminate pair being directed towards each other. The form and arrangement of the avicularia present a very marked feature. On all the cells there is a small avicularium with a sharp-pointed mandible, lodged in the edge of one or both lateral processes; while in many cells this position is occupied, on one side, by an avicularium of enormous size, frequently nearly equalling the cell in length. These large avicularia, when present, are situated on that side of the cell towards which the mouth inclines.

The ovicell is of large size, and surmounted by an avicularium sessile on a thick calcareous process. Encircling and forming the upper rim of the mouth is a large semilunar plate on each side, the two being united together in the mesian line.

Of the two varieties the first is very common, the second of much rarer occurrence.

EXPLANATION OF FIGURES.

PLATE 24.—Fig. 2, natural size. Fig. 2*a*, front view of ordinary single and double cells, magnified. Fig. 2*b*, front view of a cell with an ovicell, magnified. Fig. 2*c*, back view of ovicell, also single and double cells, magnified.

PLATE 24, FIG. 3.

CATENICELLA VENTRICOSA (BUSK).

DESCRIPTION.—Cells ovate. Fenestræ 7, pyriform or with a line from the pointed inner extremity. Lower lip entire, notched, or with a small suboral foramen. Lateral processes of moderate size, the upper division generally pointed upwards. Back of cell smooth.

REFERENCE.—Busk, Voy. Ratt., i., 357; Cat. Mar. Pol. Brit. Mus., t. 2, f. 1, 2; t. 3, f. 1–5.

Forms large, dense, brownish tufts, 3 or 4 inches high, and is of common occurrence. It is readily distinguished by the number and arrangement of the foramina, and by the smooth back of the cell.

EXPLANATION OF FIGURES.

PLATE 24.—Fig. 3, natural size. Fig. 3*a*, front view of a branchlet, magnified. Fig. 3*b*, back view of a single and double cell, magnified.

PLATE 24, FIG. 4.

CATENICELLA HASTATA (BUSK).

DESCRIPTION.—Cells ovate. Fenestræ surrounding a scutiform area, and with intermediate fissures radiating towards the median line. Lateral processes very wide, the upper portion with several small perforations. Back minutely sulcate.

REFERENCE.—Busk, Voy. Ratt., i., 355; Cat. Mar. Pol. Brit. Mus., t. 2, f. 3, 4.

Queenscliff, Western Port, Cape Otway, and other localities; frequent.

Forms thick brownish-white tufts, 1 to 3 inches high. It is readily distinguished by the peculiar scutiform arrangement of the fenestræ and intermediate fissures, and by the perforated superior lateral processes.

EXPLANATION OF FIGURES.

PLATE 24.—Fig. 4, natural size. Fig. 4*a*, front view of a branchlet, showing single and double cells with ovicell also, magnified. Fig. 4*c*, back views of ovicell with ordinary cells also, magnified. Fig. 4*b*, drawn by mistake, back of cells with adherent extraneous matter.

PLATE 24, FIG. 5.

CATENICELLA RUFA (P. MACGIL.).

DESCRIPTION.—Cells vase-formed. Front with numerous round fenestræ, the circumferential being the largest. Mouth with a notch in the lower lip. Lateral processes small and pointed. On the back of the cell an elevated band runs up the middle, sending a narrow branch horizontally to each lateral process, and a small band extends up each side. Ovicells large, cribriform, surmounted by two avicularia.

REFERENCE.—P. H. MacGillivray, Trans. Royal Soc. Vict., 1868.

Common, forming handsome reddish-brown tufts, 4 or 5 inches high.

This and the next species, although presenting many points of resemblance, are easily distinguished. The cells in both are of nearly the same size and form, and are cribriform in front. In

both the exterior foramina are of much larger size, and usually form a distinct series round the edge of the cell. Both have frequently a semicircular area beneath the mouth more elevated than the rest, and both are destitute of the upper appendage of the lateral process.

In *C. cribraria* the lower lip is entire, and there is a crescentic pore a short distance beneath it; the avicularia are lodged in deep gaping excavations in the tolerably large lateral processes; and the back is smooth and destitute of any special marks. In *C. rufa*, the lower lip presents a constant notch; the lateral processes are small and pointed, and the notch for the avicularium is very shallow and inconspicuous; and the back of the cell is occupied by a broad mesial band connected inferiorly with two narrow lateral ones, and sending off superiorly on each side a narrow band to join the lateral in the avicularian processes. In this and the next species the fenestræ are probably formed by the opening of small tubercles.

Explanation of Figures.

Plate 24.—Fig. 5, natural size. Fig. 5*a*, front view of ovicell, with other cells attached, magnified. Fig. 5*b*, front view of a branchlet of cells, magnified. Fig. 5*c*, back view of ovicell, magnified. Fig. 5*d*, back view of branchlet, magnified.

Plate 24, Fig. 6.

CATENICELLA CRIBRARIA (Busk).

Description.—Cells oval or subglobular. Surface cribriform, with a suboral lunate pore, the circumferential foramina being largest. Lateral processes destitute of superior appendage, deeply excavated for the reception of the avicularia, and produced inferiorly as a narrow fringe along the side of the cell. Back of cell smooth.

Reference.—Busk, Voy. Ratt., i., 359; Cat. Mar. Pol. Brit. Mus., t. 5, f. 3, 4.

Queenscliff, Sealers' Cove, Western Port, and other localities.

Explanation of Figures.

Plate 24.—Fig. 6, natural size. Fig. 6*a*, front view of a branchlet of single and double cells, magnified. Fig. 6*b*, back view of cells, magnified.

PLATE 24, FIG. 7.

CATENICELLA ALATA (WYV. THOMSON).

DESCRIPTION.—Cells pyriform. Fenestræ, 5–7. Lateral processes very large, extending as a broad flat fringe the whole length of the cell. Back of cell minutely sulcate.

REFERENCE.—Wyville Thomson, Dublin Natural History Review, April 1858, quoted in Microscopical Journal, 1859, p. 143.

Queenscliff.

Forms small tufts of a pinkish color, about an inch high, growing on polyzoa and algæ. It is at once distinguished from the other species by the enormous width of the lateral processes, each of which is as large as the cell. The avicularian chamber is a long narrow tube, expanding in the outer half and contracting at the orifice. There is a constant pyriform or triangular opening in the process immediately above the avicularian chamber, and generally one or more irregular ones in the lower part of the fringe.

EXPLANATION OF FIGURES.

PLATE 24.—Fig. 7, natural size. Fig. 7*a*, front view of cells, magnified. Fig. 7*b*, back view of cells, magnified.

PLATE 24, FIG. 8.

CATENICELLA LORICA (BUSK).

DESCRIPTION.—Cells elongated, truncated at both ends. Fenestræ, 3, two below the mouth, and one median much larger. Lateral processes of considerable size. Back of cell minutely sulcate.

REFERENCE.—Busk, Voy. Ratt., i., 358; Cat. Mar. Pol. Brit. Mus., t. 1, f. 1–3.

Queenscliff and elsewhere; not common.

Forms tufts one or two inches high, of a dirty reddish-white color. Beneath the third division of the lateral process, which is

very wide and covered by a thin membrane, is another similar closed compartment extending almost to the base of the cell. This gives to the cell a peculiar hexagonal or rhomboidal figure, which, with the constant three foramina, at once distinguishes this from the other species. The ovicell is of large size, surmounted by a single avicularium.

Explanation of Figures.

Plate 24.—Fig. 8, natural size. Fig. 8*a*, front view of cells, with ovicell, magnified. Fig. 8*b*, back of cells, magnified.

Plate 24, Fig. 9.

CATENICELLA FORMOSA (Busk).

Description.—Cells pyriform or subglobular; in front covered with numerous papillæ; a broadly linear or elliptical vitta extends up each side. Lateral processes large, straight or nearly so above, produced downwards as a narrow fringe, a round perforation at the base of each. Avicularia small, lodged in shallow excavations. Back of cell smooth.

Reference.—Busk, Voy. Ratt., i., 360; Cat. Mar. Pol. Brit. Mus., t. 7, f. 1, 2.

Queenscliff, Cape Schanck, Rivoli Bay, and other places.

This, the largest as yet known of the vittate division, forms handsome dusky-brown tufts. The cells are broadly pyriform or subglobose. The front is covered with minute, pointed, papillæ, and has, on either side, a broad vitta, extending from the base to nearly the level of the lower lip. The lateral processes are large, straight above, generally projecting a little upwards, and produced inferiorly into a narrow fringe usually running to the base of the cells; on each process there is at the base nearly opposite the lower lip a constant round opening; the avicularium is of small size, and lodged in a shallow excavation in the edge of the lateral process.

Explanation of Figures.

Plate 24.—Fig. 9, natural size. Fig. 9*a*, front view of cells, magnified. Fig. 9*b*, back view of cells, magnified.

PLATE 24, FIG. 10.

CATENICELLA ELEGANS (BUSK).

DESCRIPTION.—Cells ovate, papillose in front. Vittæ sublateral, extending about half-way up the cell. Lateral processes large, projecting slightly forwards, blunt, with an excavation under the point for the small avicularium. Ovicell superior, projecting on the surface of the cell above, with which it is incorporated, with a smooth margin.

REFERENCE.—Busk, Voy. Ratt., i., 361; Cat. Mar. Pol. Brit. Mus., t. 9, f. 3, 4.

Forming small glassy tufts, 1 to 2 inches high; frequent.

This is distinguished from the other small vittate species by the short sublateral vittæ and imperforate lateral processes. The ovicell is of similar structure to that of *C. Buskii*, but the upper edge is smooth. Thomson's *C. Dawsoni*, judging from his description and figure, and from specimens which seem referable to it, I believe to be a form of this species.

EXPLANATION OF FIGURES.

PLATE 24.—Fig. 10, natural size. Fig. 10*a*, front view of a branchlet of cells, magnified. Fig. 10*b*, back view of cells, magnified.

PLATE 24, FIG. 11.

CATENICELLA PERFORATA (BUSK).

DESCRIPTION.—Cells elongated, minutely papillose in front. Vittæ narrow, lateral, extending the whole length of the cell. One or both lateral processes usually large, triangular, pointed forwards, perforated at the base, or forming a blunt cupped process. Ovicell galeate, sessile on one of the cells of a geminate pair, terminal, smooth, or slightly tuberculate.

REFERENCE.—Busk, Cat. Mar. Pol. Brit. Mus., t. 8, f. 1, 2.

Not uncommon.

In most of the specimens with ovicells the lateral processes are very small.

EXPLANATION OF FIGURES.

PLATE 24.—Fig. 11, natural size. Figs. 11*a* and 11*c*, front view of cells, magnified. Fig. 11*b*, front view of double cell with ovicell, magnified. Fig. 11*d*, back view of cells, magnified. Fig. 11*e*, back view of ovicell, magnified.

Plate 24, Fig. 12.

CATENICELLA BUSKII (Wyv. Thomson).

Description.—Cells very much elongated, narrow. Vittæ very narrow and extending the whole length of the cells. Ovicell galeate, superior, projecting on the surface of the cell above, with which it is incorporated, with a beaded border.

Reference.—Wyville Thomson, Dublin Natural History Review, April 1858.

A small species growing on other polyzoa; rare. Readily distinguished from the other small species by the long, entirely lateral vittæ, and the adnate beaded ovicell.

Explanation of Figures.

Plate 24.—Fig. 12, natural size. Fig. 12*a*, front view of a branchlet of cells with ovicell, and showing the side view also of some cells, magnified. Fig. 12*b*, another series of cells, front view, magnified. Fig. 12*c*, back view of cells, magnified.

Plate 24, Fig. 13.

CATENICELLA HANNAFORDI (P. MacGil.).

Description.—Cells wide, ovoid or subglobular. Lateral processes large, gaping, directed forwards, usually equal on both sides. Vittæ narrow, entirely lateral, extending the whole length of the cell. Anterior surface smooth, or very finely papillose; posterior surface faintly sulcate.

Reference.—P. H. MacGillivray, Trans. Royal Soc. Vict., 1868.

Lady Bay, Portland, adhering to algæ; Mr. Hannaford.

This species may be distinguished by the large gaping avicularian processes, directed a good deal forwards, and almost surrounding the mouth and the narrow entirely lateral vittæ.

Its closest ally is *C. ringens*, which I have not seen.

Explanation of Figures.

Plate 24.—Fig. 13, natural size. Fig. 13*a*, front view of a branchlet, showing single and double cells, magnified. Fig. 13*b*, back view of ditto, magnified.

PLATE 24, FIG. 14.

CATENICELLA CRYSTALLINA (WYV. THOMSON).

DESCRIPTION.—Cells pyriform. Lateral processes wide, extending as a broad fringe the whole length of the cell. Vittæ narrow, reaching as high as the mouth. Anterior surface smooth or with small papillæ. Back of cell sharply ridged.

REFERENCE.—Wyville Thomson, Dublin Natural History Review, April 1868.

This species occurs in small glassy tufts on other polyzoa. It is readily distinguished from all the other vittate species by the very wide lateral processes which extend as a wide hollow fringe the whole length of the cell. There is generally a minute avicularium in a small cup-shaped depression, and there is usually an arched opening or mark in the fringe opposite the cell mouth.

EXPLANATION OF FIGURES.

PLATE 24.—Fig. 14, natural size. Fig. 14*a*, front view of a branchlet of cells, magnified. Fig. 14*b*, back view of a portion of ditto, magnified.

PLATE 24, FIG. 15.

CATENICELLA CARINATA (BUSK).

DESCRIPTION.—Cells pyriform. Lateral processes very much produced horizontally on either side. A minute denticle on either side of the mouth at the junction with the lower lip. A thin horny membranous area, below the lip, supports three small conical elevations. Back carinate. "Ovicelligerous cells geminate."

REFERENCE.—Busk, Voy. Ratt., i., 363; Cat. Mar. Pol. Brit. Mus., t. 6, f. 4, 5, 6.

Forms small brownish tufts, rare.

At once readily distinguished from all the other species by the peculiar horizontally spreading lateral processes, and the prominently ridged and umbonate back of the cell. In old specimens the suboral horny part is thickened and the protuberances are worn off, and there is then the appearance of three fenestræ.

EXPLANATION OF FIGURES.

PLATE 24.—Fig. 15, natural size. Fig. 15*a*, front view of a branchlet, showing side view of cells also, magnified. Fig. 15*b*, back view of single and double cells, magnified.

PLATE 24, FIG. 16.

CATENICELLA AURITA (BUSK).

DESCRIPTION.—Cells ovate or sub-globular. Front tuberculate, the larger tubercles towards the centre. Lower lip deeply notched. On each side of the mouth above are two or three thick, hollow, blunt processes, the upper the larger. Lateral processes large, with gaping avicularia.

REFERENCE.—Busk, Cat. Mar. Pol. Brit. Mus., t. 4, f. 1, 2, 3.

Occurs in small whitish tufts, about half an inch or an inch high, attached to zoophytes and algæ.

In this species the appearance of the cell varies very much, according to the age and state of preservation of the specimen. In good specimens the front is richly tuberculate, and there are no perforations, or at most one suboral. With age or attrition the lateral tubercles disappear and the central larger ones are opened. In old specimens, as commonly seen, we have the appearance of 4 or 5 fenestræ surrounding a large, raised, suboral opening, as figured and described by Busk. The ovicell is situated on the summit of a single cell, and has a gaping avicularium on either side. The avicularium is generally much smaller or abortive on one side.

EXPLANATION OF FIGURES.

PLATE 24.—Fig. 16, natural size. Fig. 16*a*, front view of a branchlet of single and double cells, magnified. Fig. 16*b*, front view of two cells, one with ovicell, magnified. Fig. 16*c*, back view of single and double cells, magnified.

PLATE 24, FIG. 17.

CATENICELLA GEMINATA (WYV. THOMSON).

DESCRIPTION.—Axial cells geminate. Front tuberculate. Mouth surrounded above by several (4 or 5) blunt hollow processes. Lower lip deeply notched. From one cell of each geminate pair, except at a bifurcation, springs a single terminal wedge-shaped cell, surmounted by two hollow blunt processes.

REFERENCE.—Wyville Thomson, Dublin Natural History Review, April 1858.

Forms very small brownish-white tufts about half an inch high. Queenscliff, and probably in other localities.

This very curious species is readily distinguished from *C. aurita*, the only form to which it has any resemblance. All the axial cells in a branch are geminate. The bifurcations are numerous, at every third or fourth cell. From the secondary cell of each geminate pair, except those of bifurcation, springs a small wedge-shaped cell.

The mouths of the ordinary geminate cells are surrounded above by a series of 4 or 5 hollow blunt processes; the wedge-shaped peripheral cells are always surmounted by a pair of long, slightly diverging processes directed upwards.

EXPLANATION OF FIGURES.

PLATE 24.—Fig. 17, natural size. Fig. 17*a*, front view of a small branchlet, showing the axial double cells and the small lateral cells, magnified. Fig. 17*b*, back view of cells, magnified.

CATENICELLA CORNUTA (BUSK).

DESCRIPTION.—Cells elongated, papillose in front. Vittæ lateral, extending the whole length of the cell. One or both lateral processes long, pointed, and recurved, with a small aperture at the base. Ovicell galeate, sessile on one of the cells of a geminate pair, terminal, surmounted by a sharp spine.

REFERENCE.—Busk, Voy. Ratt., i., 361; Cat. Mar. Pol. Brit. Mus., t. 10, f. 1, 2, 3.

Forms small greyish tufts, 1 to 2 inches high. Queenscliff.

The only species with which this is likely to be confounded is *C. perforata*, from which it may be distinguished by the retrocedent spinous lateral processes, and by the spine on the summit of the ovicell.

CATENICELLA INTERMEDIA (P. MACGIL.).

DESCRIPTION. — Cells large, wide. Mouth vertical or nearly so. Front of cell with five large fenestræ. Lateral processes very wide, usually abortive on one side. Back of cell smooth.

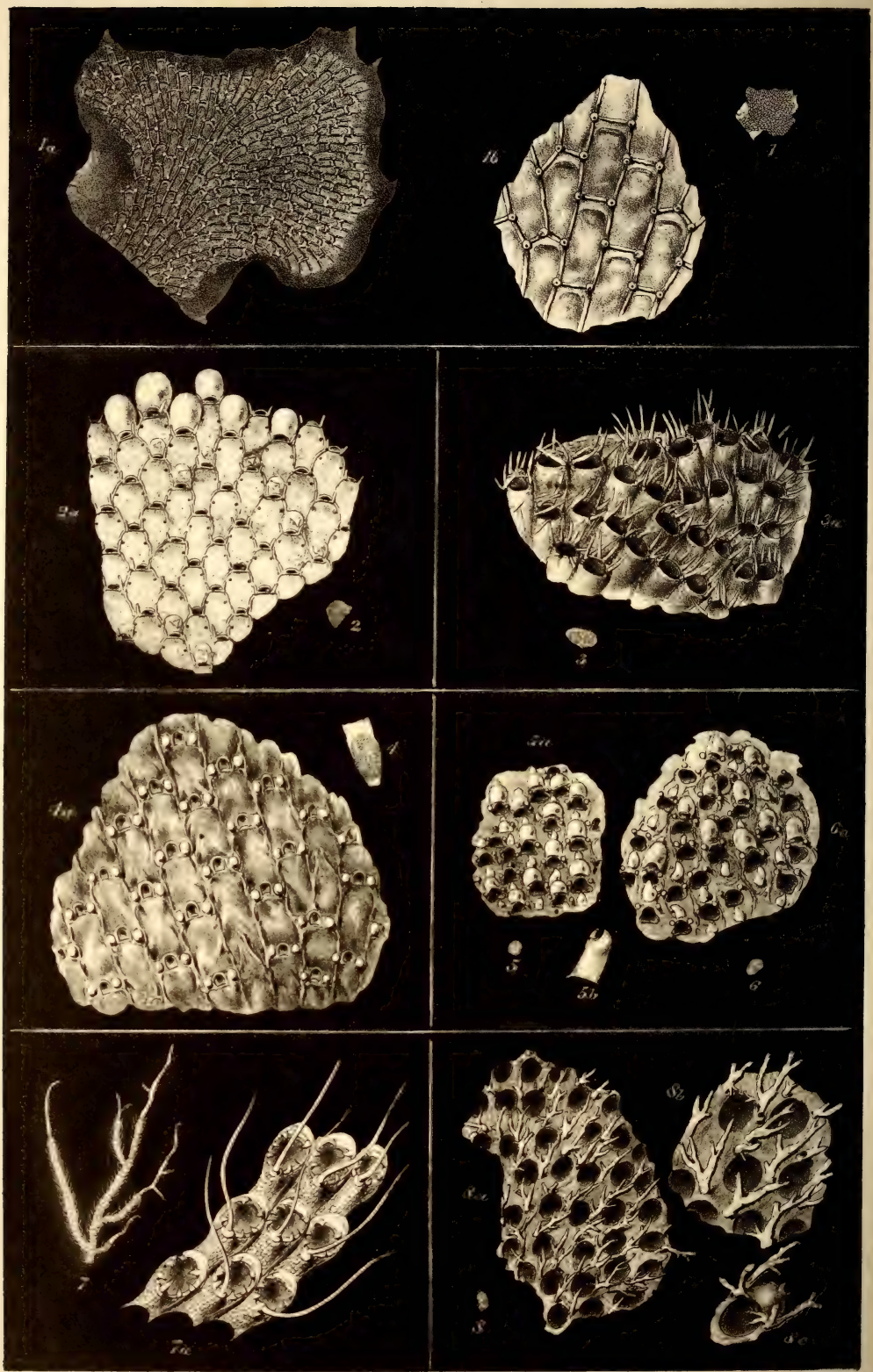
REFERENCE.—P. H. MacGillivray, Trans. Royal Soc. Vict., 1868.

Queenscliff.

From *C. plagiostoma*, to which it is closely allied, it may be distinguished by the following characters :—The mouth is straight, or nearly so ; the anterior foramina, although arranged in the same manner, are of smaller size ; there are none of the peculiar enormous spoon-shaped avicularia ; the back also is smooth. The large lateral process, with its tolerably large avicularium, usually exists only on one side of the cell.

Mr. Goldstein has furnished me with some notes and sketches of the animal of *C. margaritacea* observed by himself and Mr. Maplestone, of Portland, but wishes to confirm the observations before publication. The descriptions are from my friend Mr. MacGillivray. The two last species are given here to complete the series of species of *Catenicella* in the collection from our shores, although there was not room on the plate to figure them. I hope to figure them on another plate hereafter with some other additions.

FREDERICK McCOY.



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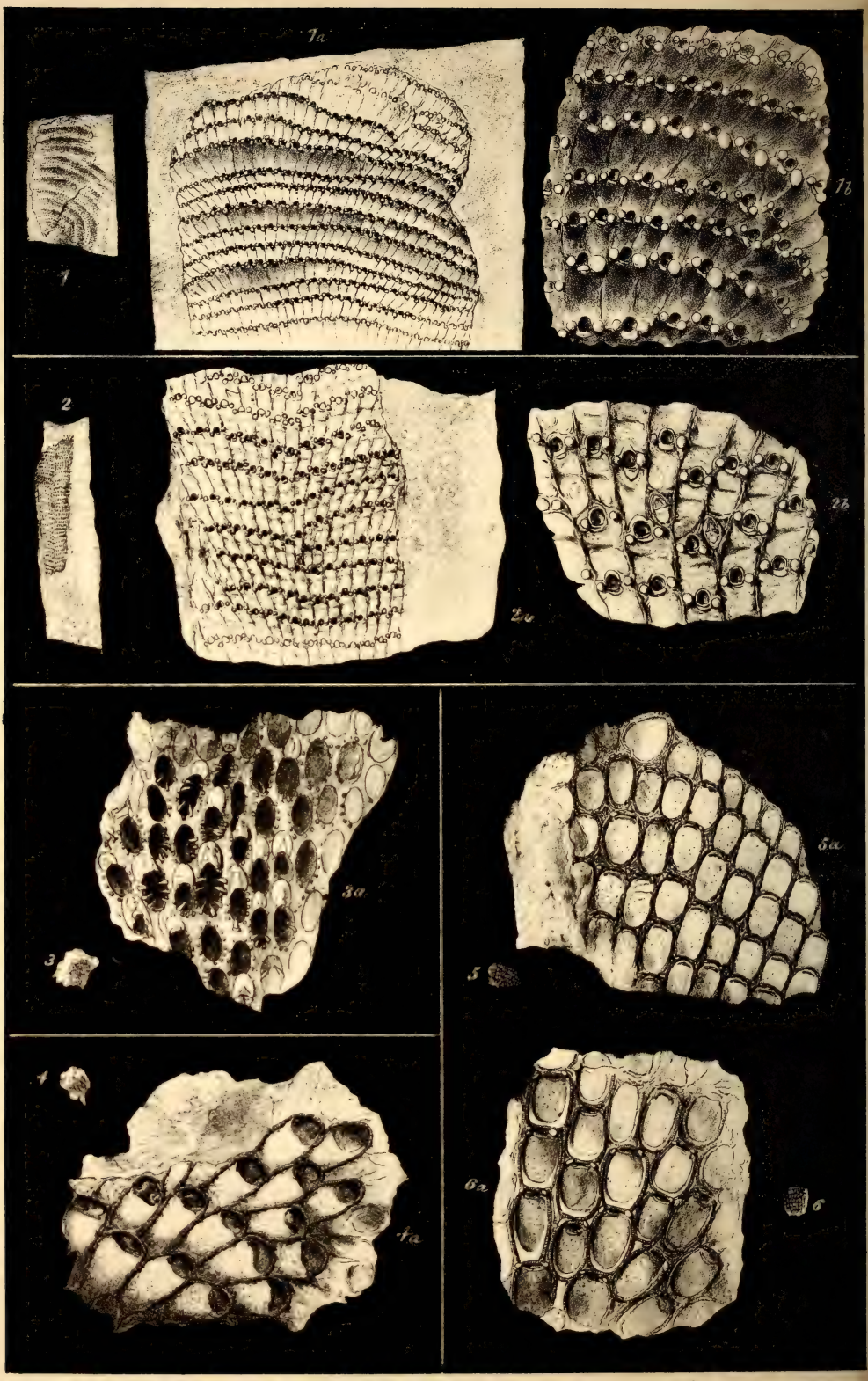

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PLATES 25 AND 26.

Plate 25, Fig. 1.

MEMBRANIPORA MEMBRANACEA (Linn. sp.).

[Genus MEMBRANIPORA (Blainville). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-Order Cheilostomata. Fam. Membraniporidæ.)

Gen. Char.—Polyzoary spreading, encrusting or occasionally suberect. Cells contiguous, irregular, quincuncial or in transverse and longitudinal series, separated by raised margins, front more or less membranous.]

Description.—Cells oblong, much longer than broad, straight or slightly rounded above, straight below, separated by raised margins; a short, blunt spine at either angle superiorly. Front entirely occupied by a thin membrane.

Reference.—*Flustra membranacea* (Linn.) Systema, 1301; Busk, Cat. Mar. Pol. Brit. Mus., p. 56, t. lxviii., f. 2.

The cells are of large size, 2 to 3 times as long as broad, nearly rectangular, and separated by prominent smooth, or slightly crenulated margins. They are arranged in lines, which frequently bifurcate and radiate, so as to give the whole cœnœcium a rounded or semilunar form.

Of frequent occurrence everywhere on our shores, creeping over broad seaweeds, on which it occasionally forms lace-like patches several inches in diameter.

Explanation of Figures.

Plate 25.—Fig. 1, specimen, natural size. Fig. 1*a*, same, magnified. Fig. 1*b*, cells, more highly magnified.

Plate 25, Fig. 2.

MEMBRANIPORA PERFORATA (P. MacGil.).

Description.—Cells very irregular in shape, generally obscurely hexagonal or pyriform; mouth narrow, with slightly thickened lips, and a stout spine at either side superiorly; front of cell minutely cribriform, with a large round opening on either side, close to the margin. Ovicell large, galeate, widely open beneath, granular. Avicularium usually at the base of a cell, mandible triangular, acute.

Reference.—P. MacGillivray, Trans. Phil. Instit. Vict., 1859.

Readily distinguished from all other species by the large circular opening on each side of the cells.

On algæ, frequent at Queenscliff and other places.

EXPLANATION OF FIGURES.

PLATE 25.—Fig. 2, specimen, natural size. Fig. 2*a*, same, highly magnified, showing the irregular form of the cells, the two sharp spines and several of the ovicells on the upper part of the figure, and the triangular avicularia on some of the cells.

PLATE 25, FIG. 3.

MEMBRANIPORA CILIATA (P. MACGIL.).

DESCRIPTION.—Cells oval; front almost entirely occupied by a calcareous granular membrane. A series of (4–7) long hollow spines articulated round the upper end of the cell.

REFERENCE.—P. MacGillivray, Trans. Roy. Soc. Vict., 1868.

It is at once distinguished by the series of long, thick, hollow, articulated spines, which are so large as to be distinctly visible without a lens, and frequently obscure the whole front of the cell. In the figure the cells are rather too prominent and the spines too small.

Occurs frequently in small patches on algæ at Queenscliff and Williamstown.

EXPLANATION OF FIGURES.

PLATE 25.—Fig. 3, specimen, natural size. Fig. 3*a*, same, highly magnified, showing the numerous long spines to aperture.

PLATE 25, FIG. 4.

MEMBRANIPORA MAMILLARIS (P. MACGIL.).

DESCRIPTION.—Cells oblong, arranged in longitudinal series, alternate; front entirely occupied by a thick membrane; mouth with a hollow, blunt spine on either side. Avicularium large, situated at the base of a cell, mandible triangular, much elongated, directed obliquely upwards.

REFERENCE.—P. MacGillivray, Trans. Phil. Instit. Vict., v. iv., p. 165, 1860.

It may readily be distinguished by the uniformity of size and alternate arrangement of the cells and by the size and obliquity of the avicularia.

This species occurs in small purplish patches on algæ at Queenscliff.

EXPLANATION OF FIGURES.

PLATE 25.—Fig. 4, specimen, natural size. Fig. 4*a*, same, highly magnified, showing the form and arrangement of the cells, aperture, and spines, with one avicularium near middle of lower part of figure.

PLATE 25, FIGS. 5, 6.

MEMBRANIPORA UMBONATA (BUSK).

DESCRIPTION.—Cells irregularly oblong or elliptical; margins scarcely raised; mouth arched above, straight below, frequently contracted about the middle, giving it a trifoliate appearance; a spine on either side. An avicularium on the summit of a thick cylindrical process on the front of each cell. Ovicell rounded or elongated, encroaching on the cell above.

REFERENCE.—Busk, Cat. Mar. Pol. Brit. Mus., p. 57, t. lxxiii., f. 6, 7.

Distinguished at once by the peculiar avicularium on the front of the cell, which is well shown in Fig. 6*a*.

On algæ, Queenscliff.

EXPLANATION OF FIGURES.

PLATE 25.—Fig. 5, portion, natural size. Fig. 5*a*, same, magnified. Fig. 5*b*, avicularium, magnified. Fig. 6, another specimen, natural size. Fig. 6*a*, same, highly magnified.

PLATE 25, FIG. 7.

MEMBRANIPORA PILOSA (LINN. SP.).

DESCRIPTION.—Cells elongated, narrow inferiorly, lower half filled in by a calcareous punctate expansion; margins of the opening bearing several (usually three on each side) short, pointed spines; a very long articulated vibraculum situated on the calcareous expansion immediately beneath the open part of the cell; mouth small, lunate.

REFERENCE.—*Flustra pilosa* (Linn.) Systema, 1301; Busk, Cat. Mar. Pol. Brit. Mus., p. 56, t. lxxi.

This, one of the most beautiful species of the genus, may at once be distinguished by the cribriform, calcareous lamina, and the long articulated vibraculum, which is usually so large as to be

distinctly visible to the unaided eye. The marginal spines are generally three on each side, short and pointed.

Common on algæ; everywhere on our shores.

EXPLANATION OF FIGURES.

PLATE 25.—Fig. 7, specimen, natural size. Fig. 7*a*, portion of same, highly magnified, showing the immensely lengthened vibraculum.

PLATE 25, FIG. 8.

MEMBRANIPORA CERVICORNIS (BUSK).

DESCRIPTION.—Cells oblong or oval, lower part filled in by a calcareous expansion; on either side of the aperture superiorly is a large branched process. Ovicell shallow, galeate, frequently surmounted by a small avicularium.

REFERENCE.—Busk, Cat. Mar. Pol. Brit. Mus., p. 60, t. c. f. 3.

This species is at once distinguished by the peculiar processes, branching like stags' horns. The Australian form differs slightly from that described and figured by Professor Busk. It has no marginal spines besides the superior branched ones, the branches of which are more slender and do not inosculate with those of the opposite spine, and the color of the polyzoary is white or brownish-white.

Williamstown, on *Sargassum;* plentiful.

EXPLANATION OF FIGURES.

PLATE 25.—Fig. 8, specimen, natural size. Fig. 8*a*, same, magnified. Fig. 8*b*, portion of same, more highly magnified to show more clearly the branching processes. Fig. 8*c*, ovicell magnified.

PLATE 26, FIG. 1.

MEMBRANIPORA DISPAR (P. MACGIL.).

DESCRIPTION.—Cells oblong, of two sizes, arranged in concentric series, a row of large cells being followed by two rows of short; mouth arched; a thick, blunt, hollow spine on each side of the mouth, in the larger cells of enormously disproportionate size.

REFERENCE.—P. MacGillivray, Trans. Roy. Soc. Vict., 1868.

The characters of this species are so peculiar that it is impossible to confound it with any other. The arrangement of the cells is very remarkable. They are of two sorts, the one form about twice the length of the other. One row of long cells is succeeded by a double row of short ones. In the short cells the oral processes are of nearly equal size, while in the long ones we have on one side of the mouth a small or moderate sized spine, and on the other a large bullate process.

Portland Bay, on algæ, a single specimen ; Rev. J. E. Tenison-Woods.

EXPLANATION OF FIGURES.

PLATE 26.—Fig. 1, specimen, natural size. Fig. 1*a*, portion of ditto, magnified. Fig. 1*b*, portion of same more highly magnified, showing the discrepancy of size in the rows of cells and the singularly large size of the hollow spines on the larger cells.

PLATE 26, FIG. 2.

MEMBRANIPORA WOODSII (P. MACGIL.).

DESCRIPTION.—Cells oblong, arranged in longitudinal and transverse series; front entirely occupied by a thick membrane; mouth large, arched above, concave below, with a blunt hollow spine on either side. Avicularium at the base of a cell, mandible broadly triangular, with the point rounded.

REFERENCE.—P. MacGillivray, Trans. Roy. Soc. Vict., 1868.

In the only two specimens I have seen, this species is readily recognized by the peculiar arrangement of the cells, diverging in slightly curved transverse rows from the mesial line, as shown in the plate. It may be distinguished from *M. mamillaris* by the marks pointed out under that species, and from the *M. dispar* by the cells being of uniform size, by the hollow lower lip of the mouth, and by the oral spines, although frequently differing in size, not presenting the same great disproportion.

Portland Bay, on algæ ; Rev. J. E. Tenison-Woods.

EXPLANATION OF FIGURES.

PLATE 26.—Fig. 2, specimen, natural size. Fig. 2*a*, portion of same, magnified to show the arrangement of the cells. Fig 2*b*, portion, more highly magnified, showing the mouth, spines, and two of the broad avicularia near the middle of figure.

PLATE 26, FIG. 3.

MEMBRANIPORA LINEATA (LINN. SP.).

DESCRIPTION.—Cells oval; margin with a series of spines, usually 5 on either side and one inferiorly, bending close over the aperture. Avicularia scattered, with a large spoon-shaped mandible. Ovicell galeate, obscurely carinate, and frequently with the lower half separated, anteriorly, by a slightly prominent semilunar ridge.

REFERENCE.—*Flustra lineata* (Linn.) Systema, 1301; Busk, Cat. Mar. Pol. Brit. Mus., p. 58, t. lxi., f. 1.

Schnapper Point; Port Fairy, Mr. Castwood; rare. The specimen figured, which is on a calcareous nodule attached to the root of a *Laminaria*, is a good deal worn, and most of the spines have been rubbed off. In other specimens they are perfect, arch forwards and almost entirely cover the aperture.

EXPLANATION OF FIGURES.

PLATE 26.—Fig. 3, specimen, natural size. Fig. 3*a*, same, highly magnified, showing the ovicells over the mouths in the middle of the figure, and the characteristic spines on the sides and lower part of the aperture, looking, when broken, like tubercles, as shown on the right-hand side of the figure.

PLATE 26, FIG. 4.

MEMBRANIPORA ROSSELII (AUDOUIN SP.).

DESCRIPTION.—Cells oval, separated by raised finely beaded margins; lower part of cell filled in by a calcareous, granular expansion.

REFERENCE.—Busk, Cat. Mar. Pol. Brit. Mus., p. 59, t. c. f. 2.

Encrusting earthy nodules attached to the roots of algæ. A small elegant species. The calcareous expansion generally occupies about two-thirds of the cell, and is minutely granular, the granulations diminishing in number towards the upper part.

I have considerable doubt in referring this to *M. Rosselii*, and am not satisfied that it is not a form of *M. Lacroixii*.

EXPLANATION OF FIGURES.

PLATE 26.—Fig. 4, specimen, natural size. Fig. 4*a*, same, highly magnified.

PLATE 26, FIGS. 5, 6.

MEMBRANIPORA LACROIXII (SAVIGNY SP.).

DESCRIPTION.—Cells oval or elongated; margins thick, strongly beaded; usually a short, blunt spine at either side superiorly.

REFERENCE.—*Flustra Lacroixii* (Savigny), Egypt, t. 10, f. 9; Busk, Cat. Mar. Pol. Brit. Mus., p. 60, t. lxix., t. civ., f. 1.

In some specimens of this species the lower part of the cell is filled in by a thick calcareous expansion (Fig. 6*a*), which extends a considerable distance up the sides, while in others it is entirely wanting, or limited to the inferior angles. Although at first sight these two forms might appear to belong to distinct species, it is not difficult to trace all the gradations between them. In specimens dredged from the ledge of sandstone rocks, off Brighton, some have the front of the cell entirely occupied by a thin membrane (Fig. 5*a*), others have merely the lower angles filled by a thicker expansion, while others present the appearance shown in Fig. 6*a*. The spines on the upper part of the cell are by no means constant; sometimes they are quite distinct, at other times they appear as slight prominences on the cell-margins, and frequently they are altogether absent.

On shells at Queenscliff and Point Cook, and on sandstone rocks, in 4–6 fathoms, off Brighton.

EXPLANATION OF FIGURES.

PLATE 26.—Fig. 5, specimen, natural size. Fig. 5*a*, same, highly magnified, of the variety wanting the thickening at base of cells. Fig. 6, another specimen, natural size. Fig. 6*a*, same, highly magnified, showing the calcareous thickened margin at base of cells of the variety.

The above descriptions of *Membraniporæ* have been kindly furnished to me by my friend Mr. P. H. MacGillivray. I have spared no trouble to render the plates as perfect as possible, and the species can be identified from them with ease and certainty.

FREDERICK McCOY.

1
2
2b
3
2d
1a

PLATE 27, FIG. 1.

GENYPTERUS AUSTRALIS (CAST.).

AUSTRALIAN ROCKLING.

[Genus GENYPTERUS (PHILLIPPI) = HOPLOPHYSIS (KAUP.) = XIPHIURUS (SM.) (Subkingd. Vertebrata. Class Pisces. Order Anacanthini. Fam. Ophidiidæ.)

Gen. Char.—Body elongate, compressed, tapering to a point at posterior end, which is surrounded by the continuation of the dorsal and anal fins, which are long and single; ventral fins replaced by a pair of bifid filaments; pectorals small, rounded; scales small, very numerous; teeth on the jaws in several rows, the outer row in front much thicker and longer than the others; row of teeth on the palate-bones and vomer larger than the largest on the jaws; lower jaw shorter than the upper; vent near middle of body; branchiostegal rays 7; pseudobranchiæ; an air bladder; and a small number of pyloric appendages; gills four.]

DESCRIPTION.—*Rays:* branchiostegal, 7; anal, 123 to 126; dorsal (to centre ray at end of tail), 159; ventral filaments with the hind ray longest; pectoral, 19 to 21. *Scales:* along lateral line about 300 (261 to 307); vertical rows of scales from front ray of dorsal to lateral line 17, below lateral line 65 to 70. *Color:* of head and body rich purplish-brown above, with a delicate lilac tint stronger towards the posterior end, irregularly marbled with confluent spots of dark vandyke-brown; cheeks and upper part of iris with a rich coppery-red bronze tint; lower part of iris silvery; lower part of the body and belly yellowish-white without mottling; dorsal fin dark-purple, mottled like the head and upper part of the body with irregular brown blotches, the extreme narrow margin whitish; anal fin lilac at base in front, with a narrow band of brown mottling, and a dull reddish-brown margin, with a narrow white line at the edge; the posterior portion of the fin becoming darker and entirely mottled like the posterior part of dorsal; pectoral fin brownish with a lilac tinge, mottled with dark-brown; throat and filamentous ventrals pale flesh-colored. Operculum terminating in an acute angle at soft posterior margin. *Teeth:* along upper jaw a row of large thick, conical, strong, outer ones, behind which are two or three irregular rows of very much smaller subequal cardiform ones; teeth of the palate-bones and vomer forming a nearly continuous single row of large conical teeth, rather larger than the outer ones of upper jaw; lower jaw with an outer row of larger conical teeth and an irregular inner row of smaller ones.

REFERENCE.—*Cast.*, Proc. Zool. and Ac. Soc. Vict., v. 1, p. 164; = *G. tigerinus*, Klunzinger Archiv für Naturgeschichte, 1872, p. 39.

The following are the dimensions of two moderate-sized specimens and a young one :—

Measurements.	Male.		Female.		Young.	
	ins.	lines.	ins.	lines.	ins.	lines.
Length from snout to distal end of caudal	30	6	30	0	15	3
„ of caudal	1	0	1	0	0	7
„ from snout to anterior edge of orbit	1	3	1	1	0	8
„ of orbit	0	10½	0	10½	0	6
„ of head from snout to end of operculum	6	10	6	3	3	4
„ from snout to anus (measured along ventral edge) ...	15	0	14	3	7	0
„ from anus to end of caudal	16	0	15	9	8	7
„ from snout to base of pectoral	6	5	6	0	3	2½
„ from snout to origin of dorsal	7	3	7	0	3	6½
„ of pectoral	2	1	1	9	1	2
Height of dorsal	1	5	1	5	0	7
Length of anal	15	6	15	6	7	0
„ of posterior ventral filament	2	5	2	1	1	2½
„ of anterior ventral filament	2	0	1	9	1	0
Width between eyes	0	9	0	7½	0	6
Depth of body in front of dorsal	5	0	5	6	1	10
Thickness of body in front of dorsal	4	3	4	6	1	3

Five scales in six lines at middle of body of the above large specimens, and nine in same space of the young one ; number of rows of scales above the lateral line the same in all.

I much doubt the propriety of separating this fish specifically from the *G. blacodes* of Foster.

Captain Hutton informs me, in reply to my enquiry, that the proportions given in his "Catalogue of the Fishes of New Zealand" for the large *Genypterus blacodes* of the southern coast of New Zealand, are erroneously printed as "length seven times that of the head," instead of four and two-thirds, and the length as "ten times the height of the body" instead of six times; which corrected proportions more nearly agree with the Melbourne fish. Dr. Günther's description of the *G. blacodes* being from such a small specimen would account for the greater size of the head and orbit in proportion to total length and length of head.

The lateral line ceases at about 2½ inches from the posterior end of the body in specimens of the above size (about 2½ feet) in the Melbourne examples. The stomachs of those opened were full of shrimps as in the European Rocklings (*Motella*), with which the colonial fisherman see some relation. It is not known whether our *Genypterus* makes the curious nest for preservation of its eggs, well known in the 5-bearded Rocklings of England.

Abundant on our coasts in the winter season ; not uncommon in the market, and moderately good for the table. It rarely reaches three feet in length, and is usually much less.

EXPLANATION OF FIGURES.

PLATE 27.—Fig. 1, average specimen, one-third the natural size. Fig. 1*a*, dentition of lower and upper jaws, vomer, and palate, natural size.

PLATE 27, FIG. 2.

GADOPSIS GRACILIS (McCOY).

THE YARRA BLACKFISH.

[Genus GADOPSIS (GÜNTH.). (Sub-kingd. Vertebrata. Class Pisces. Order Anacanthini. Fam. Gadopsidæ.)

Gen. Char.—Body moderately elongate, ovate ; head moderate, lower jaw much shorter than snout ; one dorsal fin, with spinous anterior rays and longer posterior portion with soft branched rays ; anal fin moderate, with three strong anterior spines. Dorsal and anal fins with a thick scaly skin on basal two-thirds of height ; caudal fin moderate and rounded, separate from dorsal and anal ; ventral fins jugular, each of a bifid filament ; branchiostegals seven ; gills four, with narrow slit behind fourth ; pseudobranchiæ glandular ; gill-opening wide ; gill-membranes not united ; an air bladder ; pyloric appendages moderate. Scales small, cycloid. Teeth small, cardiform, in numerous rows on the jaws, palate-bones, and vomer ; much larger conical teeth on outer row of jaws. Fresh water, Australia and Tasmania.]

DESCRIPTION.—*Form:* slender, elongate, the profile of back very slightly convex, nearly straight (more so than in *G. marmoratus*); profile of head moderately convex (less so than in *G. marmoratus*), concave over eye ; snout semi-oval, prominent ; lower jaw more broadly rounded and much shorter than the snout ; tubular anterior nostrils nearer to the end of snout than to the edge of orbit ; posterior ones simple, nearer to eye ; space between the eyes slightly convex ; operculum ending in a slightly acute angle with a small spine ; superior maxillary, when the mouth is closed, extending to vertical of posterior third of the eye ; small scales extending over the whole head, except the jaws, snout, and cheeks in front of the eyes. *Rays:* branchiostegal, 7 ; anal, 21, the first 3 short and spinous ; dorsal, 11 or 12 spinous, 26 or 27 not spined ; ventral, of two filaments, inner or hind ray longest ; pectoral, 16 to 17 ; caudal, 23 or 25. *Scales:* along lateral line, 100 to about 140 if the small terminal ones be counted ; vertical rows of scales from front ray of dorsal to lateral line, 21 to 23 ; below lateral line, 56 to 68. *Color:* extremely variable ; some specimens light olive-green, becoming yellowish-white towards the belly ; the back, sides, and fins marbled with distant, irregular patches of dark-brown ; other specimens have the dark-brown spots very much more numerous, smaller, and extending over the belly as well as over the head, back, sides, and fins ; such specimens having the smaller intervening spaces on the head, back, and sides dark brownish-olive, and with an orange tint on the base of the pectoral and belly ; iris silvery. *Teeth:* in

upper jaw, with 5 or 6 large conical ones at the outer edge on each side, within which is a band becoming narrower behind of about 7 rows of very minute cardiform ones, about 62 in the length; the patch of small cardiform ones on the palate-bones about 7 rows across; the small quadrate patch of cardiform teeth on the vomer slightly larger than those on the palate; lower jaw, with about 9 strong conical teeth on the outer edge, within which about 7 rows of minute cardiform ones. About 5 large mucous pits on each side below lower jaw.

The following are the dimensions of three specimens varying from the largest :—

Measurements.	Largest, Yarra.		Moderate, Watts'.		Smallest, Yarra.	
	ins.	lines.	ins.	lines.	ins.	lines.
Length from snout to distal end of caudal	25	0	9	7	4	11
„ of caudal	3	7	1	6	0	11½
„ from snout to anterior edge of orbit	1	6	0	9	0	4
„ of orbit	0	9	0	5	0	3
„ of head from snout to end of operculum	5	3	2	3½	1	0
„ from snout to anus, measured along ventral edge ...	14	3	5	1	2	5
„ from snout to base of pectoral	5	6	2	4	1	1½
„ from snout to origin of dorsal	7	1	2	9	1	3½
„ of pectoral	2	5	1	1	0	7½
„ of dorsal	12	0	4	10	2	4
„ of anal	4	6	2	2	1	0
„ of ventral, longer filament	2	0	1	3	0	7
„ of ventral, shorter filament	1	4	0	10	0	4
Width between eyes	1	2	0	6	0	3
Depth of body in front of dorsal	5	3	1	7	0	10
Thickness of body in front of dorsal	4	0	1	1	0	6
Height of posterior part of dorsal	1	9	0	10½	0	6
„ of second spine of dorsal	0	10	0	4	0	2
„ of posterior part of anal	2	0	0	10½	0	6
Length of second anal spine	0	6	0	3½	0	2½
Number of scales above lateral line about middle of body in a space of 3 lines	3		5		8	

The coloring of this fish is so exceedingly variable that it is only those specimens in which the brown mottling is most abundant that the term "Blackfish" seems appropriate, while in many others where the brown spots are larger, much fewer, and more distant, and not extending to the belly, the general tint of the whole fish seems a light yellowish-olive, whitish below. The scales vary in different parts of the body, some having the posterior margin truly cycloid and the lines of growth only slightly waving, while others have the margin so much indented and the lines of growth so much undulated as to make a slight approach to the ctenoid type of scale.

The genus *Gadopsis* is one of the most extraordinary genera of fishes known, as furnishing an intermediate type between the *Acanthopterigious* fishes, in which the anterior rays of the dorsal fin are simple spines, and the scales usually ctenoid, and the *Malacopterigious* fishes, in which all the rays are soft and branched, and the scales usually cycloid: here, the cycloid scales, the general form, the imperfect, filamentous, jugular, ventral fins, and the majority of the characters so nearly agree with the *Malacopterigious* fishes, that all the most recent writers, with Dr. Günther, classify it with the *Anacanthini* (agreeing generally with the *Malacopterigii* of older writers), although the anterior rays of the dorsal and anal fins are distinctly spinous.

As Dr. Richardson states that the head of his *Gadopsis marmoratus* forms one-quarter of the whole length, including the caudal fin, I think it is better to assign a new specific name to the present more slender and smaller-headed fish, which occurs in great abundance in the River Yarra. It is readily caught with a line, and forms an excellent fish for the table.

There is a second species of *Gadopsis* proportionately shorter, deeper, and with a much more convex dorsal outline, abounding in the Bunyip River in Gippsland, to which I have given the name *Gadopsis gibbosus* (McCoy); the difference of outline and proportion easily distinguishing it from the present better known fish; it agrees with Richardson's species in having the head one-fourth of the total length including the caudal, and in the profile rising from the snout to the highest part of the back at base of dorsal with a regular gentle convexity, contrasting with the present species, in which the back scarcely rises from a little behind the eye. *G. gibbosus* has, however, 12 spines in the dorsal, and *G. marmoratus* is said to have only 10.

Explanation of Figures.

Plate 27.—Fig. 2, rather small specimen, natural size, of the light-colored variety, with the few large distant dark marblings not extending on the belly. Fig. 2*a*, one of the scales, magnified twelve diameters, showing the nearly simple posterior margin. Fig. 3, another scale, showing the occasional irregular undulation or notching of the posterior margin. Fig. 2*b*, teeth of upper and lower jaws, palate-bones, and vomer.

Frederick McCoy.

1
1a
1b
1c
1d
1e

PLATE 28.

SCOMBER PNEUMATOPHORUS (DE LA ROCHE).

THE SOUTHERN MACKEREL.

[Genus SCOMBER (LIN.). (Sub-kingd. Vertebrata. Class Pisces. Order Acanthopterygii. Fam. Scomberidæ.)

Gen. Char.—Elongate, fusiform; mouth wide; first dorsal of slender spines, separated by a distinct interval from the second dorsal, which is composed of soft branched rays, with one spine in front; five or six finlets behind the dorsal and anal fins. Scales very small. Teeth small on the jaws, vomer, and palate-bones. Sides of the tail ridged. Branchiostegal rays seven. Air bladder simple or absent. Pyloric appendages very numerous. Cosmopolitan, in temperate and warm seas.]

DESCRIPTION.—*Fins:* 1st dorsal of 12 slender spines; 2nd dorsal of 1 short spine and 11 soft branched rays; anal of one short spine and 12 soft rays; pectoral, 19; ventral, one spinous and 5 soft rays; caudal, 17; 5 finlets behind anal and dorsal fins. *Height:* $5\frac{1}{4}$ to $5\frac{1}{2}$ in total length without caudal fin, or $\frac{1}{6}$th to end of caudal; head $3\frac{3}{4}$ in length of body, or $4\frac{1}{4}$ to end of caudal; diameter of eye about $3\frac{3}{4}$ in length of head. *Color:* back and upper half of sides bluish- and greenish-grey, with about 33 irregular, transverse, flexuous, branching, darker streaks about their own width apart, separating into rounder and more isolated spots along middle of sides, below which there are very numerous close dark-grey dots or freckles, on a whitish-pearly ground, tinged with yellow, purple, and slight pink reflexions; cheek behind eye yellowish; forehead between eyes whitish; fins dark-greyish. Iris silvery and yellowish. A simple slender air bladder. *Scales*: along lateral line, about 200; above lateral line, from front of dorsal fin, 15; below lateral line, under 1st dorsal, about 35. *Teeth:* subequal, slender, arched, about 70 in a single row on upper jaw, and 46 on lower jaw (about 18 in a space of 3 lines); a small oval group of about 7 teeth on each side of front of roof of mouth; a long narrow sigmoid band on each palate-bone.

REFERENCE.—Cuv. and Val., Hist. Nat. Pois., v. 8, p. 36; Tem. Faun. Jap. Pois., t. 47, f. 1.

I cannot find the slightest difference between our Hobson's Bay and Mediterranean specimens on comparison. Steindacher, it will be remembered, believes *S. pneumatophorus* to be the young of *S. colias* (Sitzungsberichte d. Akad. Wissenschaften zu Wien., lvii., p. 353). The speckling of the lower part of the sides and belly is, when alive, like that of the Spanish Mackerel (*S. colias*), but when preserved for some time in spirit these disappear, leaving the belly and lower part of sides plain silvery, as described in the *Scomber Australasicus* of Cuvier and Val., the claims of which to rank as a distinct species seem to me very doubtful. The eyelids leave the middle third of the eye bare. The preoperculum is radiatingly striated, and of yellowish-bronzy tint.

I have not yet met with the Mackerel without a swim-bladder mentioned by some authors from our seas.

The detailed measurements are as under :—

Measurements.	Ins.	lines.
Length from snout to distal end of caudal	9	8
„ of caudal	1	4
„ from snout to anterior edge of orbit	0	10
„ of orbit	0	7
„ of head from snout to end of operculum	2	5
„ from snout to anus (measured along ventral edge) ...	5	5
„ from anus to end of caudal	4	2
„ from snout to base of pectoral	2	4
„ from snout to origin of 1st dorsal	3	1
„ „ „ 2nd dorsal	5	8
„ „ „ ventral fin	2	10
„ of pectoral	1	$1\frac{1}{2}$
Height of 1st dorsal	1	$1\frac{1}{2}$
„ 2nd dorsal	0	6
Length of anal	0	$7\frac{1}{2}$
„ ventral fin	0	10
Width between eyes	0	7
Depth of body in front of dorsal	1	6
Thickness of body in front of dorsal	1	1

This beautiful fish occurs rarely in Hobson's Bay, generally in the month of June, and in considerable numbers when it does appear.

Explanation of Figures.

Plate 28.—Fig. 1, specimen of usual coloring when alive, two-thirds of the natural size. Fig. 1*a*, section near tail. Fig. 1*b*, interior of mouth, one-fifth larger than nature, to show the number and arrangement of the teeth. Fig. 1*c*, top of head to show the form of the white forehead. Fig. 1*d*, section in front of dorsal. Fig. 1*e*, some of the teeth magnified. Fig. 1*d*, scale of lateral line, magnified. (The spots on lower part of sides and belly are slightly too large and dark).

Frederick McCoy.

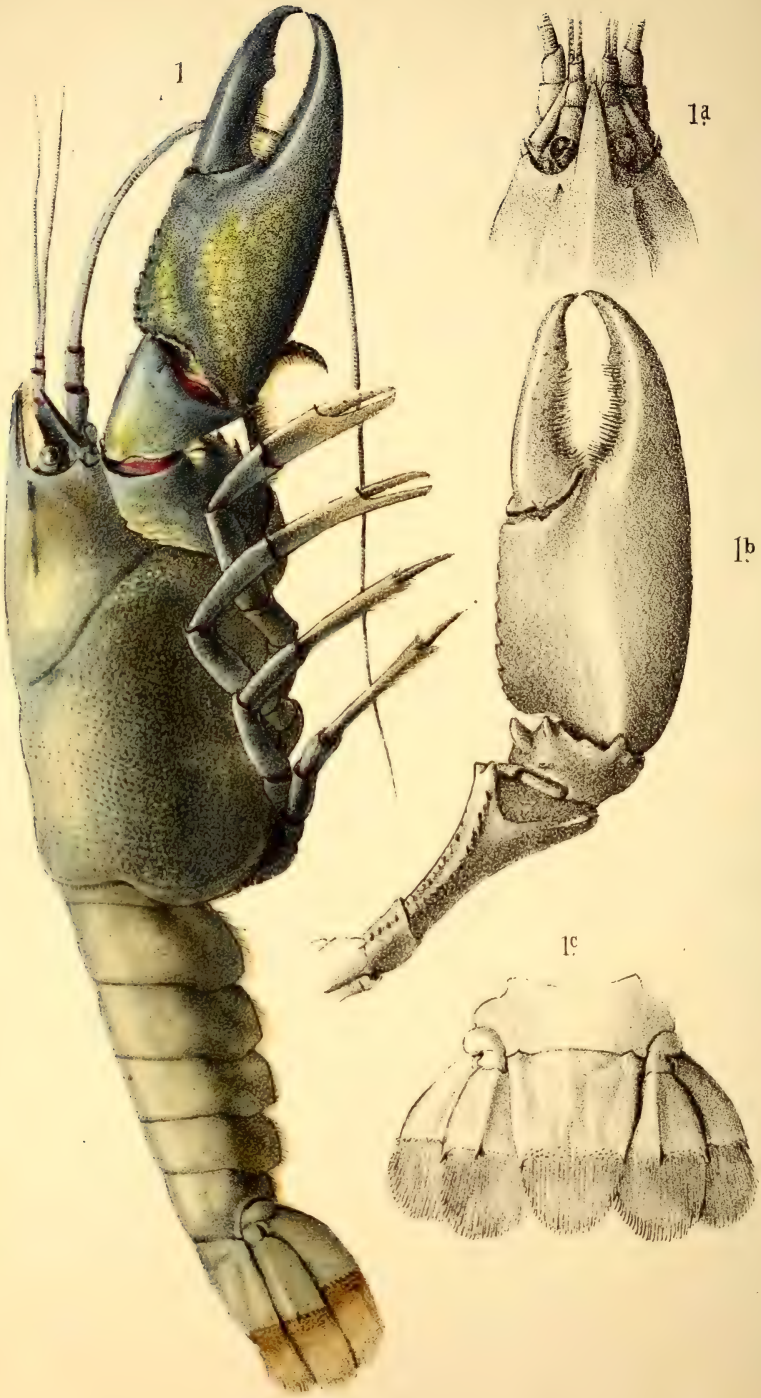
1
1a
1b
1c

PLATE 29.

ASTACOIDES BICARINATUS (GRAY SP.).

THE YABBER CRAYFISH.

[Genus ASTACOIDES (GUÉR.). (Sub-kingd. Articulata. Class Crustacea. Order Decapoda. Section Macrura. Fam. Astacidæ.)

Gen. Char.—General form and character of *Astacus*, but with the first segment of the abdomen destitute of appendices. Abdominal feet membranous, with a row of small calcareous plates on each margin. Outer pair of tail-fins jointed, with the distal portion thinner and less calcareous than the proximal one; inner lobe not distinctly jointed, and calcareous to the end. Fresh waters of Madagascar and Australia].

DESCRIPTION.—Beak acutely pointed, bounded by a narrow, rounded, prominent, smooth ridge on each side, between which the surface is nearly flat, slightly convex behind; apex acutely pointed, with a small tooth on each side, reaching as far forward as the base of the last large joint of the outer antennæ, or slightly behind the base of the last large joint of the inner antennæ, and behind the apex of the large basal scale of outer antennæ. Carapace subcylindrical, moderately convex above and on the sides; two long, narrow, prominent, subparallel ridges extend from the orbits (one on each side), a little outside the base of the rostral marginal ridges, about two-thirds of the way to the nuchal furrow; whole surface of carapace and abdomen destitute of spines or tubercles, but impressed with moderately close, irregular punctures; outer pair of tail-fins with a distinct transverse joint at about two-fifths from the base, separating abruptly the spinulose, serrated, posterior margin of the thick, calcareous, proximal portions from the distal, thin, flexible, semimembranous part; calcareous basal portion of inner pair of fins nearly as long as the membranous part, without joint or serrated division, but having a sharp spine terminating a ridge along the outer edge and another terminating a larger ridge a little on the inner side of the middle; middle flap of the fin with the calcareous portion slightly longer than the thin membranous portion, and having a small spine terminating the lateral margin on each side. Anterior pair of feet or claws nearly equal; the outer edge, and under and upper surfaces of each hand moderately convex and smooth, without spines, the inner edge compressed with a row of about 14 small compressed blunt spines; the fixed and movable finger of each claw round and smooth on the outer edge, with short incurved points, and having the inner edges set with very small, numerous, unequal teeth; carpus smooth above and outside, having one strong spine in middle of inner edge, with one smaller below and in front of it, and one still smaller at base with a few intermediate granules; the next joint of the leg has a compressed slightly-toothed or serrated upper edge (about six scarcely formed or raised teeth), a smooth outer and inner surface with a small spine on each side of carpal joint; lower edge with two rows of very irregular small spinous tubercles. Anterior median process of epistome semicircularly rounded, or very slightly pointed and semielliptical, slightly longer than wide. *Color:* whole body and abdomen dull pale-olive, varying in some to greenish-horn color; membranous part of tail-flaps pale-brown; anterior pair of legs bright-blue, the basal and outer portion of upper surface of hand mottled with scale-shaped spots of dull ochreous-yellow, skin of joints bright-red. Length of small average specimen from snout to tip of tail, 4 inches 7 lines; length of carapace from tip of snout along mid-line of back, 2

inches 1 line; diameter of carapace, 1 inch; length of carpus, 7 lines; length of hand, 1 inch 7 lines; width of hand, 8 lines; length of inner antennæ, 1 inch 4 lines; of outer antennæ, 4 inches.

REFERENCE.—*Astacus bicarinatus* (Gray) in Eyre's Australia, v. 1, p. 491, t. 3, f. 2.

This species grows to six inches in length, from snout to end of tail, and varies considerably in color, some having the body and abdomen dark-olive, others paler or with a yellow tinge, and some are of a dull pale-brown or horn color; the large anterior pair of claws are always blue with red joints, and the flexible part of the five tail-fins dull-brown. The smaller pairs of legs are blue, or greenish, or whitish in different living individuals. These are eaten in great numbers by the aborigines, and by some other people who like them. They are commonly known about Melbourne by the native name of Yabber or Yabbie.

This species does not seem to inhabit the flowing rivers or streams, but is abundant in the quarry-holes and swamps round Melbourne, and in most waterholes in the colony, doing great damage to dams and reservoirs from burrowing holes through the banks. The individuals live for a long time underground in their burrows after the pools of water on the surface have dried up. I can find no difference between the specimens from the swamps of the Murray district on our northern boundary and those near Melbourne.

EXPLANATION OF FIGURES.

PLATE 29.—Fig. 1, average specimen, natural size. Fig. 1*a*, rostrum and top of head, viewed from above, showing basal joints of both sorts of antennæ, with the large outer basal scale of external ones. Fig. 1*b*, claw, viewed from the inner side. Fig. 1*c*, tail-flaps, viewed from above.

FREDERICK McCOY.

1a
2a
2b
3
1
4
5
2
6
7

PLATE 30.

ZEUZERA (EUDOXYLA) EUCALYPTI (BOISD. HERR.-SCHÆF.).

THE WATTLE GOAT-MOTH.

[Genus ZEUZERA (LATR.). (Sub-kingd. Articulata. Class Insecta. Order Lepidoptera. Section Heterocera. Fam. Hepialidæ.)

Gen. Char.—Body stout; abdomen extending much beyond the extended hind wings. *Palpi* short, proboscis nearly obsolete. Legs stout, nearly bare; hind tibiæ with two minute, apical spurs. *Wings* elongate, ovate, narrow; anterior pair pointed, very oblique along exterior border, nearly straight along anterior edge or costa; discal areolet intersected by a forked veinlet; second superior vein forked at half its length; second inferior vein more than twice further from the third than from the first; third a little further from the fourth than from the second. *Antennæ* as long as or shorter than thorax of male, deeply bi- or tri-pectinate on basal half; distal half simple, minutely serrated: antennæ of female simple; ovipositor long.]

DESCRIPTION.—*Male.*—Upper side: back of head and front and sides of thorax greyish-white, from numerous, long, spatulate, white hairs amongst the shorter and more numerous brown ones; triangular middle space of thorax dark-brown, sometimes with a mid-line of grey hairs on hinder half, bordered by a narrow blue-black border, forming a triangular horse-shoe shaped band separating it from the lighter anterior and lateral color. Abdomen dark vandyke-brown, with a large white patch on each side of anterior segment, and the posterior edges of each segment, especially the four anterior ones, fringed with greyish-white spatulate hairs. Anterior wings dark umber-brown, with ferruginous veins, between which is a thick irregular reticulation of black, and a very irregular whitish discal stripe extending to the apex of the wings, of more elongate spatulate scales than the darker parts. Hinder wings of the same rusty-brown ferruginous tint as the veins of the anterior wing, with a thick black reticulation between the veins on the apical half; the basal half with the plain ferruginous tint, with a narrow white outer margin. Under side: head, legs, and anterior part of thorax rich dark-brown; posterior middle part of thorax and the abdomen white; anterior wings of a dull umber-brown, with blackish reticulation between the veins and a whitish posterior margin; hind wing like the anterior in color (destitute of the ferruginous color of the upper side), having the black reticulations more extended towards the base. Length of body, 2 inches 2 lines to 2 inches 3 lines; from tip to tip of expanded wings, 4½ inches to 5 inches 2 lines.

Female.—Larger than the male, with usually the whitish sides of thorax, edges of abdominal segments, and discal stripe less distinct, or more brown; the posterior wings more richly ferruginous in tint, and with less of the black reticulation than in the male. Length of body, 2 inches 3 lines to 3 inches; from tip to tip of expanded wings, 5 inches 3 lines to 7 inches. Ovipositor when exserted more than half the length of the abdomen.

REFERENCE.—Herrich-Schæffer, Lepidop. Exot., fig. 164; Walker, Cat. B. M., Heteroc., p. 1539.

The coloring is very variable, firstly in the richness of the ferruginous tint of the hinder wings, but more particularly in the whitish parts; the whitish stripe along the anterior wings, although

usually more distinct in the male than in the female, is sometimes almost absent or reduced to a small discal spot and a trace of the stripe at the apex of the wing in male specimens. The front and sides of the thorax also vary, for, although usually whitish in the male and brownish in the female, the two sexes are sometimes alike in this respect from the longer spatulate white scales or hairs being more or less abundant; and similarly the edges of the abdominal segments are usually browner or less distinctly margined with white in the female than in the male, but both sexes vary considerably in this respect.

My late friend Mr. Walker, in his Catalogue of the British Museum *Heterocera*, suggests that the *Eudoxyla d'Urvillei* (Herr.-Sch.) is only the female of this species, and I can see no difference in the figure; but as the different locality of Tonga Tabu is given for it, I hesitate to combine the species.

The moths of the family *Hepialidæ* are popularly known as "Swifts" or "Swift-moths," from the great quickness of their direct flight in the dusky twilight. The group is divided into three sections, typified by, 1st, the *Hepialus*, the true Swifts or Ghost-moths; 2nd, by *Cossus*, or the Goat-moths; and, 3rd, by *Zeuzera*, or the Wood-leopard-moths, as they are popularly called, respectively. They all have a complex neuration of the wings, which are deflexed when at rest. The larvæ of all are thick fleshy naked grubs, with a few hairs; they have 6 pectoral, 8 ventral, and 2 anal feet; and have the prothorax protected by a broad horny shield; often spending three years in the larva state. Those of the first group inhabiting subterranean burrows and feeding on the roots of grasses; those of the other two feeding on the interior of the wood of timber trees, to which they prove very destructive from boring great vertical canals, so weakening the tree that it either dies or is blown over. In most forest-bearing countries the natural enemy of these larvæ and protector of the trees from their destructive action is the group of Birds of the family *Picidæ* or Woodpeckers, who by instinct know where the larvæ are, and by the powerful strokes of their suitable bills cut down quickly on the larvæ through the sound wood, and, transfixing the grub with their long worm-like barbed tongue, draw it out, and devour it.

In Australia alone the Woodpeckers have not been provided; and the consequence is that every tree cut up for firewood is seen to be traversed with large cylindrical canals made by these or allied larvæ, which are the greatest destroyers of our forests—so abounding in the wood of almost every forest tree that, in a storm, it is dangerous to go near a large tree, as one apparently sound will snap across unexpectedly with a moderate wind from the number of these larvæ tracks.

The classical reader will remember the praises lavished by the Roman epicures of old on the *Cossus* as a delicacy for the table; being a thick, pink, fleshy caterpillar, as large as a man's finger, extracted from the wood of the Willow trees, and produced by a Goat-moth belonging to this family; it is curious to find that the very similar larvæ of the present insect, abounding in the Wattle trees, or *Acaciæ*, of Australia, are highly prized for food by the natives. When properly cooked, I am told by all bushmen that they are delicious, but circumstances over which I have no control have prevented me from trying them, to test the fact myself.

Considering the great importance attached lately by the Government to the preservation and cultivation of the Wattle or *Acacia* trees, and the great and increasing annual money value of the bark, it is important for bark-strippers and the persons employed by the Government to foster the growth of the Wattles to know the appearance of the insect represented on our plate, as the greatest destroyer of these trees, so that attention may be given to killing the perfect moth; the large abdomen of the female of which is distended with millions of eggs, each of which will produce a voracious grub as thick as the thumb and five or six inches long, eating the timber for years.

It is unfortunate that the specific name *Eucalypti* should have been given to this species, as it never frequents any species of *Eucalyptus* or Gum-tree, but feeds exclusively on the wood of the different species of the *Acacia* or Wattle trees.

The larva, hatched from eggs laid in crevices of bark of the branches, works steadily into the interior of the tree, proceeding head downwards, enlarging the cylindrical burrow as it gradually grows larger and eats its way downwards, often reaching to the

roots. When about to assume the pupa state it forms a slight cylindrical cocoon from four inches to a foot long of silk and saw-dust-like small grains of wood, as a lining to the end of its burrow. When the burrow terminates in a root a few inches below the surface of the ground, the cocoon is continued from the hole in the wood upwards as far as close to the surface of the ground; but when the burrow ends in the surface of the trunk of the tree above the ground level there is no prolongation of the cocoon. In either case the pupa works itself forward by means of the little, deflected, spines on the rings, pushing for half an inch or so through the end of the cocoon before it bursts to allow the imago to escape.

The ovipositor of the females is of extraordinary length and rigidity, equalling half the length of the abdomen when exserted, but capable of being entirely retracted out of sight; with this the eggs are deposited deep in the crevices or fissures of the bark of the trees, on the inner timber of which the larva feeds.

Common in the winged state about February, flying in the twilight, in all parts of the colony where Wattle trees abound.

Explanation of Figures.

Plate 30.—Fig. 1, average specimen of male, natural size; the right-hand pair of wings separated from the body by a narrow space represent the under side. Fig. 1*a*, antennæ of male, magnified to show the bipectination confined to the basal half. Fig. 2, female, natural size, in resting position to show the deflexion of the wings; the antennæ laid back. Fig. 2*a*, one of the antennæ of the female, magnified to show the absence of the pectination on the whole length in that sex. Fig. 2*b*, small portion of female antennæ, further magnified. Fig. 3, posterior end of abdomen of female with the ovipositor exserted. Fig. 4, pupa, natural size, viewed sideways. Fig. 5, cocoon, with anterior part of pupa projecting and burst open as left by the moth on emerging. Fig. 6, young bright carmine stage of growth of the larva, showing the broad, brown speckled, corneous shield on the anterior end, with the larva in the cylindrical burrow which it forms in the wood of the *Acacia*, working as usual downwards. Fig. 7, pale cream-colored nearly half-grown larva, natural size, viewed in profile.

Frederick McCoy.

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Natural History of Victoria.

PRODROMUS

OF THE

ZOOLOGY OF VICTORIA;

OR,

FIGURES AND DESCRIPTIONS OF THE LIVING SPECIES OF ALL CLASSES

OF THE

VICTORIAN INDIGENOUS ANIMALS.

DECADE IV.

BY

FREDERICK McCOY,

HONORARY FELLOW OF THE CAMBRIDGE PHILOSOPHICAL SOCIETY; HONORARY ACTIVE MEMBER OF THE IMPERIAL SOCIETY OF NATURALISTS OF MOSCOW; CORRESPONDING MEMBER OF THE ZOOLOGICAL SOCIETY OF LONDON; HONORARY MEMBER OF SEVERAL OTHER SCIENTIFIC SOCIETIES, ETC.
PROFESSOR OF NATURAL SCIENCE IN THE MELBOURNE UNIVERSITY.
DIRECTOR OF THE NATIONAL MUSEUM OF NATURAL HISTORY AND GEOLOGY OF MELBOURNE, ETC.

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M DCCC LXXIX.

PREFACE.

It having been considered desirable to ascertain accurately the natural productions of the Colony of Victoria, and to publish works descriptive of them, on the plan of those issued by the Governments of the different States of America, investigations were undertaken, by order of the Victorian Government, to determine the Geology, Botany, and Zoology of the Colony, to form collections illustrative of each for the public use, and to make the necessary preparations for such systematic publications on the subject as might be useful and interesting to the general public, and contribute to the advancement of science.

As the geological and botanical investigations have already approached completion, and their publication is far advanced, it has been decided to now commence the publication of the third branch completing the subject, namely, that of the Zoology or indigenous members of the different classes of the animal kingdom.

As the Fauna is not so well known as the Flora, it was a necessary preliminary to the publication to have a large number of drawings made, as opportunity arose, from the living or fresh examples of many species of reptiles, fish, and the lower animals, which lose their natural appearance shortly after death, and the true characters of many of which were consequently as yet unknown, as they had only been described from preserved specimens. A Prodromus, or preliminary issue, in the form of Decades or numbers of ten plates, each with its complete descriptive letterpress, will be published, of

such illustrations as are ready, without systematic order or waiting for the completion of any one branch. The many good observers in the country will thus have the means of accurately identifying various natural objects, their observations on which, if recorded and sent to the National Museum, where the originals of all the figures and descriptions are preserved, will be duly acknowledged, and will materially help in the preparation of the final systematic volume to be published for each class when it approaches completion.

This fourth Decade gives illustrations in the first plate and in the text of the Eared Fur-Seal, or Sea-Bear, of the Victorian coasts, of sufficient fullness to set at rest the question of its specific distinction from the nearly allied New Zealand one.

The second plate represents for the first time a small, new, pretty, poisonous snake of the rare genus *Furina*.

The third plate shows the colors of the fresh state of a rare species of *Sebastes*, popularly known as the Banded Red Gurnet-Perch.

The fourth plate figures another of the few fishes of our bay unmistakably identical with an English species, namely, the Angel-fish or Angel-Shark.

The four following plates are devoted to careful illustrations of the twenty-nine species of *Lepralia*, found in Hobson's Bay, of which only six have been figured before.

The ninth plate illustrates our five species *Crisia*, only two of which had been previously figured.

The tenth plate shows the dwelling cases, larvæ, pupæ, and adult states of two species of those most abnormal and curious of all Lepidopterous Insects, the so-called Case-Moths, or House-builder Moths, which in habits, and in structure of the female, differ completely from any other *Lepidoptera*. The more abundant of the two, the case of which is found in numbers on nearly every tree in the colony, has not been figured before in the adult state.

The succeeding Decades will illustrate as many different genera as possible, and will deal first usually with species of some special interest, and of which good figures do not exist, or are not easily accessible.

FREDERICK McCOY.

1st October 1879.

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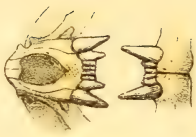

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1 a

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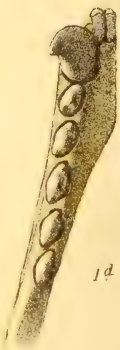

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PLATE 31.

EUOTARIA CINEREA (PÉRON SP.).

AUSTRALIAN SEA-BEAR OR FUR-SEAL.

[Genus EUOTARIA (GRAY). (Sub-kingd. Vertebrata. Class Mammalia. Order Feræ. Section Pinnipedia. Fam. Phocidæ. Sub-fam. Otarinæ.)

Gen. Char.—Incisors, $\frac{3-3}{2-2}$; upper outer ones very large, like canines; four middle ones small and with cutting edges doubled by a transverse groove; lower ones small, subequal, simple. Canines, $\frac{1-1}{1-1}$; large, conic. Molars, $\frac{6-6}{5-5}$; triangular, pointed, compressed, with a small cusp at base, behind or before, or both; sixth or hind molar entirely behind the hind margin of front of zygomatic arch, with anterior branch of fang arched, diverging to front; the fangs of fourth and fifth imperfectly divided by a sulcus. Skull depressed; of males, broad with the occipital portion elevated and becoming crested with age; that of females narrower, not so elevated behind, and with little or no occipital crest; palate extending to middle of zygoma. Head blunt. Anterior limbs falcate with 4 or 5 rudimentary nails; hind limbs bent forwards when resting or walking, with long nails on three middle toes and very small ones on the two outer toes. Body tapering, tail short. Males larger and with proportionately larger limbs than the females. Hair rather coarse, with scanty or no under-fur at base.]

DESCRIPTION.—Head, viewed from above, semi-oval, slightly pointed at the snout; profile descending with a slight convexity from the occiput to the tip of the snout, from whence the surface bends abruptly inwards and downwards at an angle of about 80° to the lower lip; tip of nose naked, jet black, with a deep median sulcus dividing the valvular nostrils, which converge at an acute angle below and are bounded externally by the fur, and internally and above by the naked part of the nose. Whiskers of about 35 strong flat bristles, blackish towards the base, whitish towards the apex; reaching, in the adult, a little beyond the ear; shorter in the young. Anterior limbs with a distinct lobe of the naked skin at the end of each of the five fingers, with a nearly straight or slightly convex edge between the lobes; the fur extends only as far as the tips of the phalanges, the first four of which have distinct but very small rudimentary nails near the posterior margin; a narrow bare portion extends along the anterior edge as far as opposite the end of the fifth phalanx. Posterior limb with the external lobe of the naked skin of margin very slightly longer than the internal one; the three middle lobes of the same length but much narrower; the nails of the three middle phalanges very large, the middle one longest, the first and fifth very much smaller, the first, or external one, smallest; naked margins of both pairs of limbs and naked part of snout jet black.

Outline showing positions of the limbs in the Eared Seals on land.

Male: length of adult, about 7 feet. *Color:* of adult, greyish dark-brown, somewhat lighter on the sides and snout, of a darker rich chesnut hue on the belly, tail, limbs, and edge of upper lip, the hind limbs darkest; under-fur scanty, of a rich

rusty chestnut; the hairs blackish at base, lighter, and browner or yellowish towards apex; ears dark-brown, black within. *Young:* blackish, darker brown (black when wet) than the adult above, yellowish about the muzzle, cheeks, and throat, rich rusty chocolate below, the under-fur of the same dull, rusty coffee-color in all parts.

Female: Length of adult (A), about 5½ feet. *Color:* yellowish ashy-grey above and on the sides, brownish on the snout, upper lip lighter; all below dark rich chestnut-brown from the base of pectoral to the tail; the anterior part of the breast and throat of the same light-grey as the upper surface; upper and lower surface of fins rich chestnut-brown, darkest below; hairs with a longer yellowish or greyish apical portion giving the iron-grey general tint with yellowish hue in some lights, the base of each hair being dark, as in the male, and with the same scant, rusty, coffee-color under-fur. *Young:* blackish-brown above, yellowish-white on throat, belly, and behind pectoral.

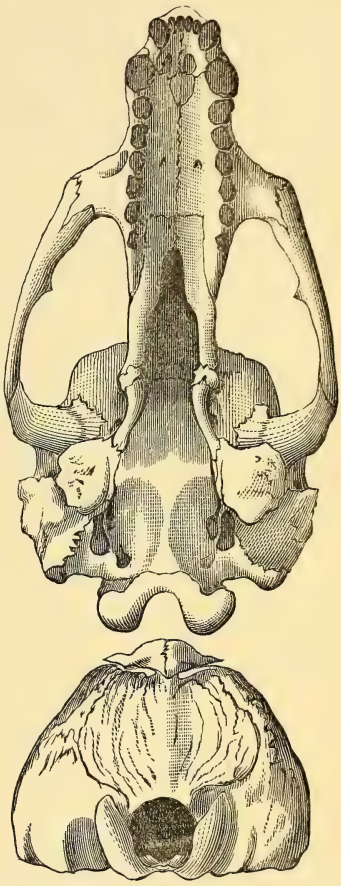
MEASUREMENTS OF SPECIMENS IN MUSEUM.

	Adult Female. (A)		Adult Male. (B)		(C)		Young. Male. (D)		Fem. (E)	
	ft.	in.	ft.	ins.	ft.	ins.	ft.	ins.	ft.	ins.
Length from tip of snout to extremity of tail ...	5	6	7	2½	5	9¾	3	0½	2	5¾
„ from tip of snout to edge of lip ...	...		...		0	2	...		...	
„ from tip of snout to occiput	0	10	1	1¼	0	10½	0	6½	0	6
„ from tip of snout to front of pectoral	2	4	2	7	2	1	1	1	0	10¾
„ between eyes across forehead ...	0	4	0	5¼	0	4½	0	3	0	2¼
„ from tip of snout to eye	0	4	0	5	0	4¼	0	2¾	0	2⅛
„ from tip of snout to ear	0	8	0	9	0	8¼	0	5¾	0	5
„ of pectoral	1	4	2	0	1	6¼	0	10	0	8
„ of ear	0	1½	0	1½	0	1¼	0	1¼	0	1
„ of tail	0	2½	0	4	0	2½	0	1¼	0	1¼
„ of hind fin	0	11½	1	2¼	1	1½	0	8½	0	6
Greatest width of hind fin	0	9	0	10¾	0	7	0	5	0	5
Whiskers	0	6½	0	5½	0	5¼	0	2¾	0	2

	ins.	lines.
Length of outer lobe beyond origin of nail	3	10
Length of second lobe from origin of nail	3	10
„ of third lobe from origin of nail	3	9
„ of fourth lobe from origin of nail	3	8
„ of fifth lobe from origin of nail	3	3
„ of inner nail	0	3
„ of fourth nail	0	9
„ of middle nail	0	11
„ of second nail	0	10
„ of first or outer nail ...	0	2½

Skull of male [specimen in table of measurements marked (c)]:—length from tip of snout to posterior edge of condyle, 10 inches; greatest width across zygomatic arches, 5 inches 6 lines; greatest height from basioccipital to slightly marked occipital crest, 3 inches 6 lines; crest scarcely marked; parietal sides of the skull moderately convex; from tip of snout to anterior edge of orbit, 3 inches; breadth from tip to tip of postorbital processes, 2 inches 2 lines; space between the orbits convex above, 1 inch 3 lines wide at narrowest posterior portion; length of lower jaw to middle of condyle, 6 inches 10 lines; greatest depth vertically under second molar, 1 inch 5 lines; depth behind fourth molar, 1 inch 1 line. *Teeth:* length of molar series of 6 teeth in upper jaw, 2 inches 4 lines; anterior molar with a middle cusp, conical, compressed, 5 lines long; with a distinct cusp at the base in front, and one slightly smaller behind; a rough, distinct, crenulated cingulum at base of crown connecting the cusps

on the inner side, with a very faint indication on the outer side of base; second molar slightly larger than the first, with the cusps at base more strongly developed; the anterior one somewhat larger and diverging more from the crown than the posterior one; third molar a little larger, with the cusps still more developed; fourth nearly resembling the third; fifth directed obliquely backwards with the cusps nearly equal; sixth, or hindermost, molar directed obliquely backwards and downwards, with the cusps scarcely marked, being nearly obsolete behind and before; the space between the fifth and sixth molar is much greater than that between the others; canine, 11 lines long, $6\frac{1}{2}$ lines wide at base, interval between it and the canine-like outer incisor, 3 lines; conical canine-like outer incisor, 6 lines long, 3 lines wide at base; inner notched incisors, 2 lines long; the 6 incisors occupying a space of 1 inch 2 lines. The last upper molar has a long anterior fang abruptly arched forward from the end of the shorter straight hind fang; the roots of the other molars only divided by a shallow groove; 5 molars in lower jaw, each with the anterior and posterior cusps well-marked, occupying a space of 1 inch 10 lines; lower canine, 1 inch 1 line long, 7 lines wide at base. Palate hollowed in front, becoming flattened behind, bordered externally by two blunt rounded ridges, extending to the outward curved hamuli of the pterygoid bone; shape of notch in posterior edge of palate bone variable, being in the male (marked C above) semi-elliptically curved, the vacancy being 1 inch wide at posterior junction of the palate with the pterygoid, and extending 1 inch 4 lines forward, or a little behind the line of the orbital process of the zygoma; while in the female (marked A above) it extends forward at an acute angle as far as a line across middle of sixth molars, and is much narrowed abruptly in the anterior half of the notch, in front of the point where the shorter and wider notch of the other skull described ends. (*See* wood-cut.) In the latter skull the hamuli of the pterygoid bone are not produced at juncture with palate bone.



View of skull from below, showing the elongate form of the hind edge of palate in one skull, and the shorter rounded form (indicated by white dotted outline) in another, agreeing in all other respects. The lower figure is a view of same skull from behind, showing little or no crest behind and the convexity between the eyes in front.

REFERENCE.—*Otaria cinerea*, Péron, Voy. aux Ter. Aust. 2, 77; Quoy and Gaimard, Zool. du Voy. de l'Astrolabe, Mam. t. 12, t. 13, t. 15, figs. 1 and 2; Gray, Hand List of Seals, &c., t. 26.

The Eared Seals, or Sea-Bears as they are called, inhabiting the coasts of Australasia present very great difficulties in their determination, from the imperfection of the descriptions and definitions of various writers, and from the uncertainty often arising as to which species, defined by the skins, agreed with species defined by the

characters of the skulls. The group generally, forming the sub-family *Otarinæ*, is easily distinguished by the remarkable appearance of subcylindrical, small, external ears; and the genera *Otaria*, and *Arctocephalus*, differing by the varying length of the palate, have been proposed for them long ago by Dr. Gray, with some other subdivisions, as *Neophoca*, *Zalophus*, *Gypsophoca*, *Euotaria*, &c., recognisable as subgenera. These Sea-Bears differ also from the true Seals in the forward direction of the hind limbs when at rest; and in their raising themselves clear of the ground on them and on the outward-turned anterior limbs when walking on land, which they do with comparative ease. The females go far inland to bring forth their young, who run after visitors, snapping at their legs and barking like dogs—according to the accounts of persons who have landed on the islands frequented by them in the breeding season. The unwilling young are taught to swim when well-grown by the female.

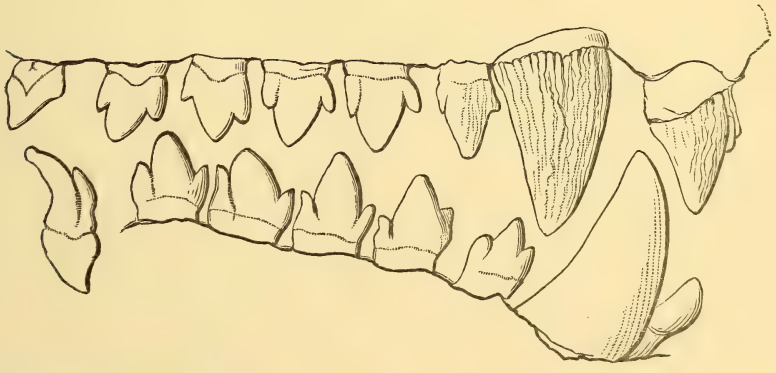
I adopt here the view of Mr. J. W. Clark (P. Z. S., Dec. 1875) after careful investigation, that the common New Zealand species is properly the *Otaria Forsteri* of Lesson; and although on Flinders' authority he quotes this species from Bass' Straits I have not seen it, and doubt its occurrence there. I also agree with Mr. Clark in confining the specific name, *O. cinerea* (Péron), to the species figured by Quoy and Gaimard in the voyage of the "*Astrolabe*," found by them at Western Port, with distinct anterior and posterior cusps to all the grinders, except the sixth upper molar, in which latter tooth the cusps are scarcely perceptible. These figures, however, are so inaccurate that if the skull and skin figured were not still in the Paris Museum it would be impossible to be certain that they really represented the species.

The naked portion of the snout in our Victorian species is only, in the large male (marked c above), about $1\frac{1}{4}$ inch long, and 1 inch 1 line in greatest width, so that it is much smaller than the corresponding part in the New Zealand species (*O. Forsteri*) of the same size, and the nostrils do not suddenly bend outwards in the upper half, as in that species, but simply converge each in a nearly straight line from the upper to the lower ends in a V-shaped pattern.

The Hon. David Moore has kindly furnished me with a great deal of valuable information respecting the old trade at Sydney in the Fur-Seals of this species. The males he mentions were more valuable than the others; these were entered in the invoices under the trade term of "Wigs," the females being entered as "Klapmatches," and the young as "Pups." The trade, he informs me, has now entirely ceased in New South Wales, Victoria, and South Australia, partly from the animals being scared away by the traffic of a multitude of steamers and other vessels, and partly from the greater scarcity of labor no longer leaving it profitable to pay a sufficiently numerous crew of a vessel to man the several boats required. Colonel Champ also informs me that five-and-twenty years ago he used to see several of the islands between the Tasmanian and Victorian shores covered with numbers of these Fur-Seals, of which it is a rare circumstance to see a single individual now in the localities where they were so common formerly.

I subjoin in foot-note an amusing notice of one of the young specimens now in the Museum, written by the late clever observer and artist, Ludwig Becker.*

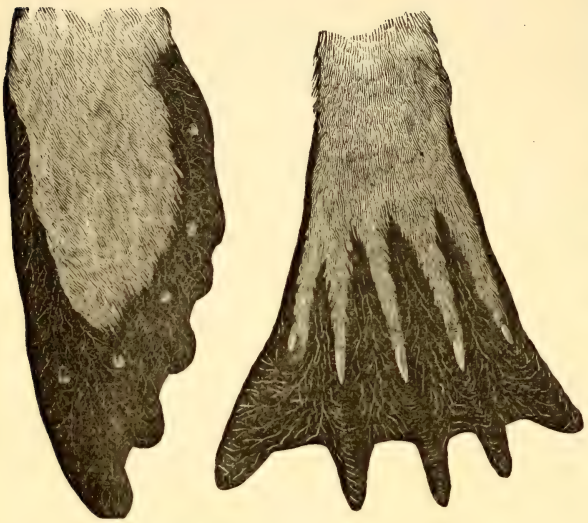
To render the comparison of the New Zealand *Otaria* with our Victorian species easy, I give here carefully-drawn wood-cuts of the teeth of *E. cinerea*, natural size, showing distinct anterior and



Side view of upper and lower teeth, natural size, viewed from the outside. The separate tooth is the last upper molar, viewed from inner side, showing the arched divided fang.

* "Professor McCoy. University, 24th January 1859.—Young female Seal, caught alive, *vis-a-vis* Wilhelmi's residence (Punt road, not far off from Gardiner's Creek road, south), sitting under a tree, early in the morning yesterday week; it was lively and galloped alongside Wilhelmi, who was leading it home with a rope. The nearest point of the Yarra is distant say

posterior cusps to them all except the last upper one, in which they are indistinct ; and I also give wood-cuts of the anterior and posterior limbs, to show the difference of the lobes and nails when compared with Mr. Clark's figure of *O. Forsteri* in his paper above referred to—in ours the lobes between the fingers of the pectoral not being marked, and the three middle lobes of the hind limb being as long as the external ones—presenting thus obvious differences.



Anterior and posterior fins, about 1-5th natural size.

All the specimens described above were killed at the Heads, near Queenscliff.

EXPLANATION OF FIGURES.

PLATE 31.—Fig 1, profile in swimming position. Fig. 1*a*, profile of skull 1-6th natural size. Fig. 1*b*, front view of ditto, showing the great, canine-like, outer, upper incisor teeth. Fig. 1*c*, half of palate and teeth, ½ natural size. Fig. 1*d*, ditto lower jaw. Fig. 1*e*, one of the molars, natural size.

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half-a-mile. It lived three hours after it was caught. If you will buy it, I think it would be the means of completing your observations on Seals.—Yours truly (signed) LUDWIG BECKER.

"Length, from end of tail to tip of nose, 2 feet 5 inches. *Color:* the back of head, back and under side of feet, and the whole back, of a brownish-black ; the hair on the roots whitish ; belly brown ; eyes dark-blue. Forearms in the middle of whole body. Head large in proportion to the length of the animal. I see some difference in the form and setting of the nails from the one I already lithographed. There are also differences in the dental system ; but I think this and the peculiar shortness of body, the color of fur, &c., &c., to be the result of the specimen being a young one. I think it is worth to be bought for the Museum, it being fresh enough for proper setting ; but haste must be made with, otherwise the hot weather will spoil it. Wilhelmi skinned it already. I believe the specimen is fully worth the price paid for the old one.—L. B."

FREDERICK MCCOY.

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1d
1e
1f
1g
1h

PLATE 32.

FURINA BICUCULLATA (McCOY).

THE TWO-HOODED FURINA-SNAKE.

[Genus FURINA (DUM. & BIB.). (Sub-kingd. Vertebrata. Class Reptilia. Order Ophidia. Family Elapsidæ.)

Gen. Char.—Body slender, cylindrical, of nearly the same diameter from the small head to base of tail, which is rather short, conical, pointed. Two rows of subcaudal plates. Scales small, uniform, smooth, in 15 or 17 rows. A row of teeth on the upper jaw behind the small anteriorly grooved fang. Rostral shield large, rounded; frontals subequal; vertex plate nearly or quite reaching the anterior ocular; no loreal, replaced by nasal, posterior frontal and ocular; one nasal pierced by nostril; one anterior and two posterior oculars. Australia.]

DESCRIPTION.—*Form:* body slender, cylindrical; head wider than neck but only a little wider than middle of body, ovate, moderately narrowed and rounded in front, broader behind, flattened above; tail small, slender. *Scales:* 17 rows of scales across middle of back, rhombic, smooth; ventral scales, 180 to 210; subcaudals, 64 to 66 pairs; anal scale double. *Plates:* rostral shield moderately large, forming the rounded projection of the muzzle, obtuse-angled behind between the anterior half of the anterior frontals; anterior frontals small, about one-third wider than long; posterior frontals about twice the length of the anterior ones; vertex plate about one-third longer than the two sets of frontals taken together, twice as long as wide, obscurely hexagonal, very obtuse-angled in front, not reaching the large anterior ocular, sides parallel, acute-angled behind; parietal and occipital shields moderately large. *Color:* color of back and sides of body and tail hazel-brown (with, in figured specimen, about 20 narrow transverse black bands on about the middle third of the body, each band about 1 scale wide and separated from the next by intervals varying from 10 to 13 scales; few of the bands go quite across the back and sides, most of them extending little more than half way from one side to the other, the imperfect bands alternately on the right and left sides); a large black patch occupies the top of the head from the posterior ends of the posterior frontals to the posterior ends of the occipital plates, encircling the eye and reaching half across the fourth labial plate in front, and obliquely from the upper post-ocular to the corner of the mouth behind, the transverse posterior edge followed by a narrow band of bright reddish cinnamon, a paler tint of the same color occupying the side and front of the head, including the rostral, both frontals, anterior and posterior oculars, temporal and upper labial plates; immediately behind the narrow reddish collar is a second large black patch a little less long than the anterior one, behind this the brown of the back is much lighter for a space of 4 or 5 scales wide; underlip and throat bluish-white; scales of belly pale-yellowish, each with two to four square, dull rusty orange patches as far as vent; eyes black with a yellow line round the circular pupil. *Teeth:* about 12 small, solid teeth behind each fang, and a row of about 20 slightly larger, on each palate bone. Length, 12 inches, of which the tail forms 2 inches; greatest width of body, 4 lines; length of gape, 5 lines.

This rare and beautiful little snake is a clear example of the genus *Furina*, distinguished from *Diemenia** by there being only a single nasal plate pierced by the small nostril, instead of two with the nostril between them. Although technically a poisonous snake, it is too small to be dangerous. In the two large black patches on the head and nape, separated by the narrow transverse light band, this new species resembles the *Furina bimaculata* (Dum. & Bib.), but differs in the proportions of the head plates, in the greater number of rows of scales on the back and in the greater number of the subcaudal scales.

No other Australian snake has the middle of the body marked with narrow distant black bands, often imperfect, on alternate sides like the example figured, but three other specimens of the same size are without them.

The genus *Cacophis* of Günther does not seem clearly distinguished from the older *Furina*, as Steindacher seems also to think. None of the described species of *Cacophis* have any approach to the large number of pairs of subcaudal plates of the present snake. The specimen figured was found in a torpid state under a piece of bark in July at Longwood, by Mr. Henry Tubb, who presented it to the Museum collection ; it has 202 ventral scales and 64 subcaudals, all divided. A second specimen, 12 inches long, of which the tail formed 2 inches, found in September, was presented by Dr. McCrea ; it has no bands on body and the spots on ventral scales are greyish ; it has 180 ventral scales, and of the 64 subcaudal plates the first seven are undivided ; in all other respects agreeing exactly with the figured specimen. A third example in the collection is $12\frac{1}{2}$ inches long, of which the tail is slightly over 2 inches ; it is without bands on the body, and the abdominal spots are very faint ; it has 210 ventral scales, 66 subcaudal scales, of which the first 4 are undivided ; in all other respects agreeing exactly with the one figured. The number of rows of dorsal scales is the same in all. Being found in the winter and early spring

* In *Diemenia superciliosa*, the common brown snake, the nostril is so large as almost to reach the edge above and below, so that it is often difficult to say whether there are one or two nasals in that species ; in some specimens in the Museum there are clearly two nasal plates.

months our specimens are no doubt of the average adult size. All our examples are from the Murray district.

The following table gives the numbers of scales and measurements of six specimens in the National Museum collection :—

Specimens.	Scales of Back.		Plates.		Length.	
	Across Middle.	Over Base of Tail.	Abdomen.	Tail.	Total.	Tail.
					ins.	ins.
1. Semi-banded specimen from Longwood ...	17	16	202	64–64	12	2
2. Unbanded, from Benalla	17	15	196	64–64*	12	2
3. Unbanded	17	15	198	62–62†	11	$1\frac{7}{8}$
4. Unbanded	17	15	203	63–63	11	$1\frac{3}{4}$
5. Unbanded	17	14	209	64–64	11	2
6. Unbanded	17	14	210	66–66‡	$12\frac{1}{2}$	2

* First seven undivided. † Third one undivided. ‡ Four first undivided.

Explanation of Figures.

Plate 32.—Fig. 1, view from above, natural size. Fig. 1*a*, side view of head, twice the natural size, to show the disposition of the colors. Fig. 1*b*, view of head and part of body from above, twice the natural size, to show the disposition of the color on the head and the black bands on body. Fig. 1*c*, under view, similarly enlarged, to show the coloring of under surface. Fig. 1*d*, outline of plates of head, from above, magnified four diameters. Fig. 1*e*, outline of plates of side view of head, four times the natural size. Fig. 1*f*, inner view of palate with rows of teeth, magnified four diameters. Fig. 1*g*, under side of tail to show the number of double rows of subcaudal plates, twice the natural size. Fig. 1*h*, a few of the abdominal plates, the divided anal plate, and a few pairs of subcaudal plates, four times the natural size.

Frederick McCoy.

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1b

PLATE 33.

SEBASTES PERCOIDES (SOLANDER SP.).

THE BANDED RED GURNET-PERCH.

[Genus SEBASTES (CUV.). (Sub-kingd. Vertebrata. Class Pisces. Order Acanthopterygia. Fam. Triglidæ. Sub-fam. Scorpæninæ.)

Gen. Char.—Ovate, compressed; head scaly on all the pieces to or beyond the orbits; no occipital groove; usually a few small spines on each side of top of head. Preoperculum armed with spines. Scales moderate; no skinny appendages on head or sides. Fins—one dorsal, the spinous portion of 12 or 13 rays separated by a notch from the soft branched rays; anal fin with three spines; pectoral moderate, rounded, with the rays of the lower half simple. Strong villiform teeth on the jaws, palatines, and vomer. Seven branchiostegals. Air-bladder generally present. Pyloric appendages few or moderate. All seas.]

DESCRIPTION.—*Form:* ovate, moderately elongate and compressed, profile of head moderately convex, lower jaw ascending when the mouth is shut, with a conspicuous knob under its symphysis forming then the anterior extremity of the head; greatest depth, between third and fourth spines of dorsal, about three and a half times in the total length, including the caudal fin; thickness of the body rather more than half the depth; length of the head slightly more than the depth of the body; curves of the back and belly nearly equal, that of the back blending gradually with the profile of the head. Orbit large, slightly more than one-fourth the length of the head, and slightly less than its own diameter from tip of snout, and its own diameter from base of suprascapular spine; space between orbits about half the vertical diameter of the eye. One strong recumbent spine just over nostril, one strong spine on nasal bone, one somewhat larger on upper front edge of orbit; middle of superciliary ridge smooth but continued with a row of 5 gradually increasing decumbent spines extending with slight divergence to back of head. The preorbital bone has two, broad, triangular spines on its lower edge, the anterior one more obtuse and flattened than the posterior. The preoperculum has 5 strong spines on its hind edge, the second from the top largest; below the edge of each is a deep pit in the edge of the bone. Two spines on the hind edge of the operculum, above and in front of which are two small, triangular, suprascapular spines. Upper edge of dorsal moderately arched, the first spine smallest and directed forwards, the third spine longest, the others decreasing gradually to the eleventh, the twelfth spine about as long as the ninth; the soft dorsal rises to about the height of the tallest spine. Seven lower rays of pectoral, thick and unbranched, projecting far beyond the membrane; border of fin slightly convex posteriorly. *Rays:* branchiostegal, 7; dorsal, 12 spinous and 13 branched; pectoral, 13; ventral, 6; anal, 3 spinous and 5 branched; caudal, 18. *Scales:* above and below lateral line in vertical series, $\frac{8 \text{ to } 12}{24 \text{ to } 22}$; along lateral line, 52 to 55. *Color:* variable; cheeks, sides, tail, and upper part of the body orange, scarlet or vermilion, and carmine-red, dotted or minutely spotted with blackish-brown, rendering the top of the head and middle of the back darkest; one or two broad vertical bands from the third to the ninth dorsal spine extend downwards three-quarters of the depth of the midline of belly; another similar band, the width of the base of the soft dorsal, extends quite across to the middle of the base of the anal; a third band crosses posterior end of body at base of caudal fin; these bands are formed by a confluence of the more numerous blackish freckles of the upper part of the body, a few of which are also scattered

between the vertical bands. All the fins are of a vermilion tinged with orange on the rays; the membrane of the dorsal, caudal, and pectoral being pale-purplish; the dorsal being strongly speckled with black at its base, especially over the transverse dark bands of the body; the membranes of the ventral and anal fins are orange; in front of the pectoral and along the lower part of the sides is a yellow-ochre tint separating the red of the upper part from the pearly white of the throat and belly.

REFERENCE.—*Scorpæna percoides*, Solander MSS. = *Sebastes percoides*, Richardson, Voy. Er. and Ter., t. 15, f. 1 and 2.

The following are the dimensions of the specimen figured:—

Measurements.	Ins.	lines.
Length from snout to distal end of caudal	12	0
„ of caudal	2	0
„ from snout to anterior edge of orbit	0	11
„ of orbit	0	11
„ of head from snout to end of operculum	3	9
„ from snout to anus, measured along ventral edge ...	6	3
„ from snout to base of pectoral	3	6
„ from snout to origin of dorsal	3	3
„ of pectoral	2	5
„ of dorsal	6	0
„ of anal	1	3
„ of ventral, longest ray	2	0
Width between eyes	0	6
Depth of body under 3rd dorsal	3	7
Thickness of body under 3rd dorsal	2	5
Height of 3rd and 4th dorsal rays	1	7
„ of 1st dorsal spine	0	7
„ of 11th dorsal spine...	0	8
„ of 12th dorsal spine	0	11
„ of soft dorsal	1	4
Depth of anal	1	5
Length of 1st anal spine	0	5
„ of 2nd anal spine	1	0

Number of scales (above lateral line about middle of body) in a space of 6 lines, 5.

The fishes of this genus (*Sebastes*) resemble *Scorpæna*, but are distinguished by the scaly covering of all the plates of the head up to the front edge of the orbit, and by the absence of the fleshy or skinny filaments to the head and sides of the body found in that genus.

The present species is popularly called "Gurnet," or "Gurnet-perch," by the fishermen and dealers, as well as the more common *Neosebastes scorpænoides* and *N. pandus*.

It has not been figured with the colors of life before.

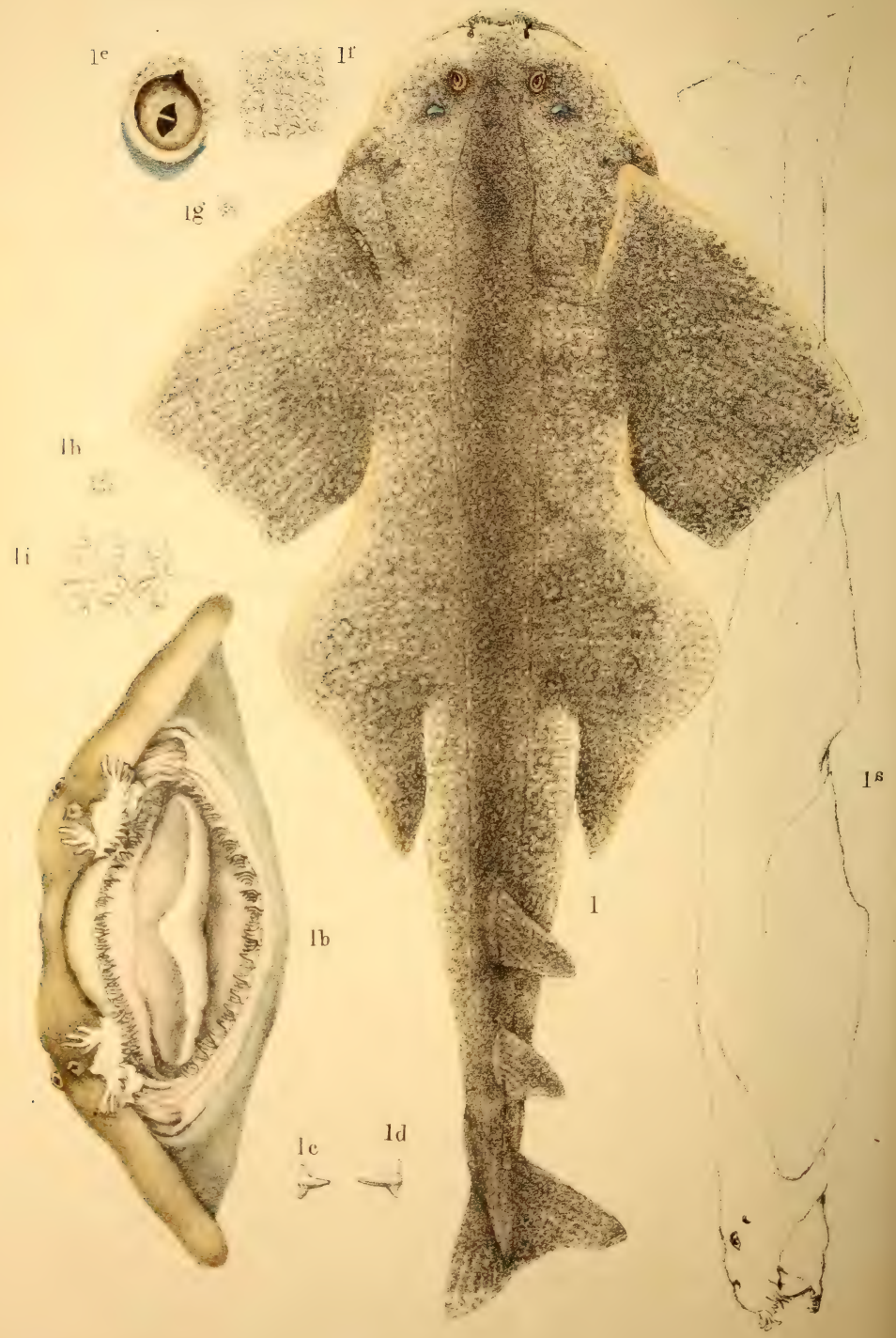
Rather rare on the Victorian coast.

EXPLANATION OF FIGURES.

PLATE 33.—Fig. 1, side view, natural colors, reduced. Fig. 1*a*, form of section of body. Fig. 1*b*, interior of mouth, showing the teeth, natural size. (Figs. 1*a* and 1*b* have been lithographed with the dorsal side downwards by the lithographer.)

FREDERICK McCOY.

Pl 3-4



A Barthelomew, del.

Prof. M^c Coy, direx^t

F Schönfeld, lithog.

PLATE 34.

RHINA SQUATINA (LIN. SP.).

THE ANGEL-FISH.

[Genus RHINA (KLEIN) = SQUATINA (DUM.). (Sub-kingd. Vertebrata. Class Pisces. Order Chondropterygii. Sub-order Plagiostomata. Fam. Rhinidæ.)

Gen. Char.—Body depressed, wide; head semicircularly rounded, with the mouth at the anterior end; pectorals very large, rhombic, fleshy, extended in the plane of the body, with the anterior part of the base extended forward as far as the head, but not united to it; gill-openings five, wide, situated on the side of the neck in the notch formed by the extension of the pectorals; eyes small, covered over with the skin of the body, except a small elliptical slit for the pupil, on the upper side of head; with the spiracles larger, wide, situated behind the eyes, while the nostrils are nearly in the same line on the front edge of the mouth, having some lobed, skinny appendages over each; teeth conical, pointed, small, triangular, without denticles, moderately notched at base with a downward lobe in the middle, no middle tooth above or below, rather distant, similar in the two jaws; tail rounded at base, keeled on the sides near the end, which runs into the lower instead of the upper end of the tail; two small separated dorsal fins on the tail; no anal fin; lower lobe of the caudal fin longer than the upper; ventral fins large, fleshy, and extended laterally like the pectorals; males with small claspers, surface of the skin rough, with minute, conical points directed backwards.]

DESCRIPTION.—As there is only one species, the form is indicated in the generic character. *Color:* above sandy-brownish lilac, the ground color being darker, minutely mottled with very numerous, small, lighter spots, the spots on the fins and eyes being darker; pinkish-white below. *Dimensions:* usually under 4 feet long; length of figured specimen, 3 feet 8½ inches; width across the pectorals, 2 feet; width across the ventrals, 1 foot 3 inches; from tip of snout to first dorsal, 2 feet 5 inches; length of first dorsal, 1 inch 6 lines; height of ditto, 3 inches 6 lines; space between the dorsals, 3 inches; length of base of second dorsal, 1 inch 9 lines; height of ditto, 3 inches; length and width of large teeth, 2 lines; width of mouth, 4 inches 2 lines; length of eye, 6 lines; distance from nostril at anterior edge of snout, 1 inch 5 lines; distance between eye and spiracle, 9 lines. The small tubercular spines are a little larger on the back than on the sides, and in some specimens there is an indistinct median line of still larger ones extending a variable distance from the first dorsal fin towards the head, and usually a few spines in front of and behind the eyes are larger than the others. Number of lobes to the fringed skinny flaps near the nostril varying in each individual.

REFERENCE.—*Squalus squatina* (Lin.), Syst. Nat., 12 ed., p. 398; Shaw, Nat. Miscel., t. 906.

If sailors be good judges of the matter, this fish must be very like an angel, for the Italian fishermen call it "Angelo," the French "Squale ange," and the English-speaking seamen in Britain and America call it commonly "Angel-fish" or "Angel-shark." If the likeness exists at all, it must be quite as strong in our Victorian specimens, of which I have had five or six preserved for the Museum collection, all caught in Hobson's Bay, and clearly identical with

the common English examples of the species; although, with its small power of swimming, and habit of keeping on the bottom, it is difficult to see how it could pass over so great a space, unless indeed, like some few dog-fish brought up by the dredgers in the "*Challenger*," it may have kept at the bottom all the way. It is a very voracious creature, all our specimens being full of various bottom-keeping fish, as well as Gasteropodous shells. The mid-line of tubercular spines on the back is entirely absent in some of our specimens, partially marked in others, and recognisable in another. The color varies a little, some of the specimens being brown, and others more greenish than the usual color mentioned above. The complexity of the branching, lobing, or fringing of the skinny flaps at the nostrils varies so much that I think Müller and Henle, and Duméril have attached too much importance to this structure in making it a character for founding distinct species. The skin was formerly used in Europe for polishing wood and ivory work.

Not very uncommon in Hobson's Bay and round our coast; sometimes reaching 5 feet in length, though most of the specimens are under 4 feet.

EXPLANATION OF FIGURES.

PLATE 34.—Fig. 1, specimen, greatly reduced, seen from above. Fig. 1*a*, outline profile, viewed from the side. Fig. 1*b*, mouth, viewed from the front, showing the position and form of the eyes, nostrils, fimbriated skinny flaps or appendages, rows of teeth, and tongue. Fig. 1*c*, upper tooth, natural size. Fig. 1*d*, lower tooth, natural size. Fig. 1*e*, eye, nearly covered with the ordinary spotted skin, having the pupil visible through a small slit. Fig. 1*f*, tubercles on sides of head, magnified. Fig. 1*g*, tubercles of side of pectoral, natural size. Fig. 1*h*, tuberculation of sides of ventrals, natural size. Fig. 1*i*, tuberculation of back, magnified.

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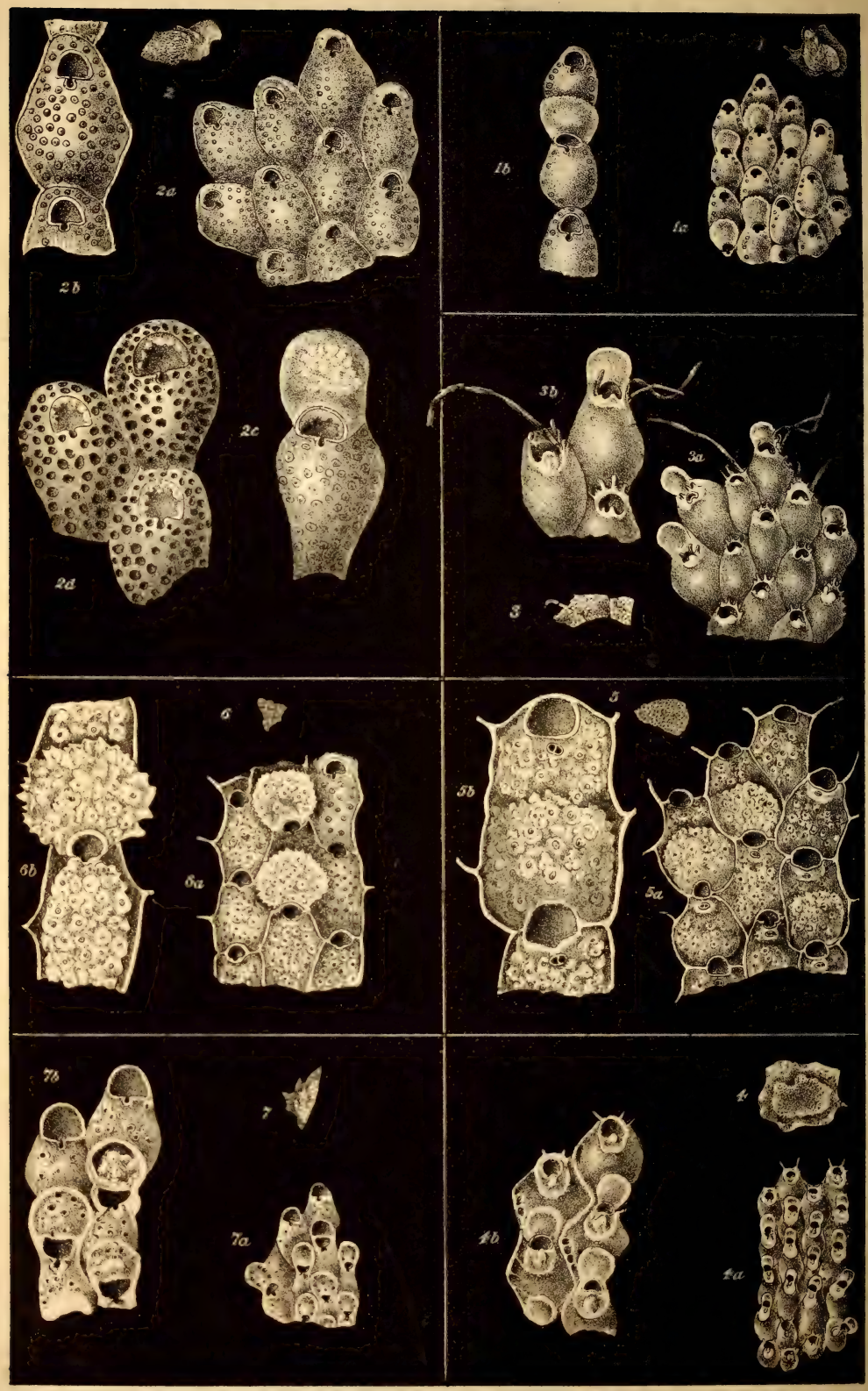
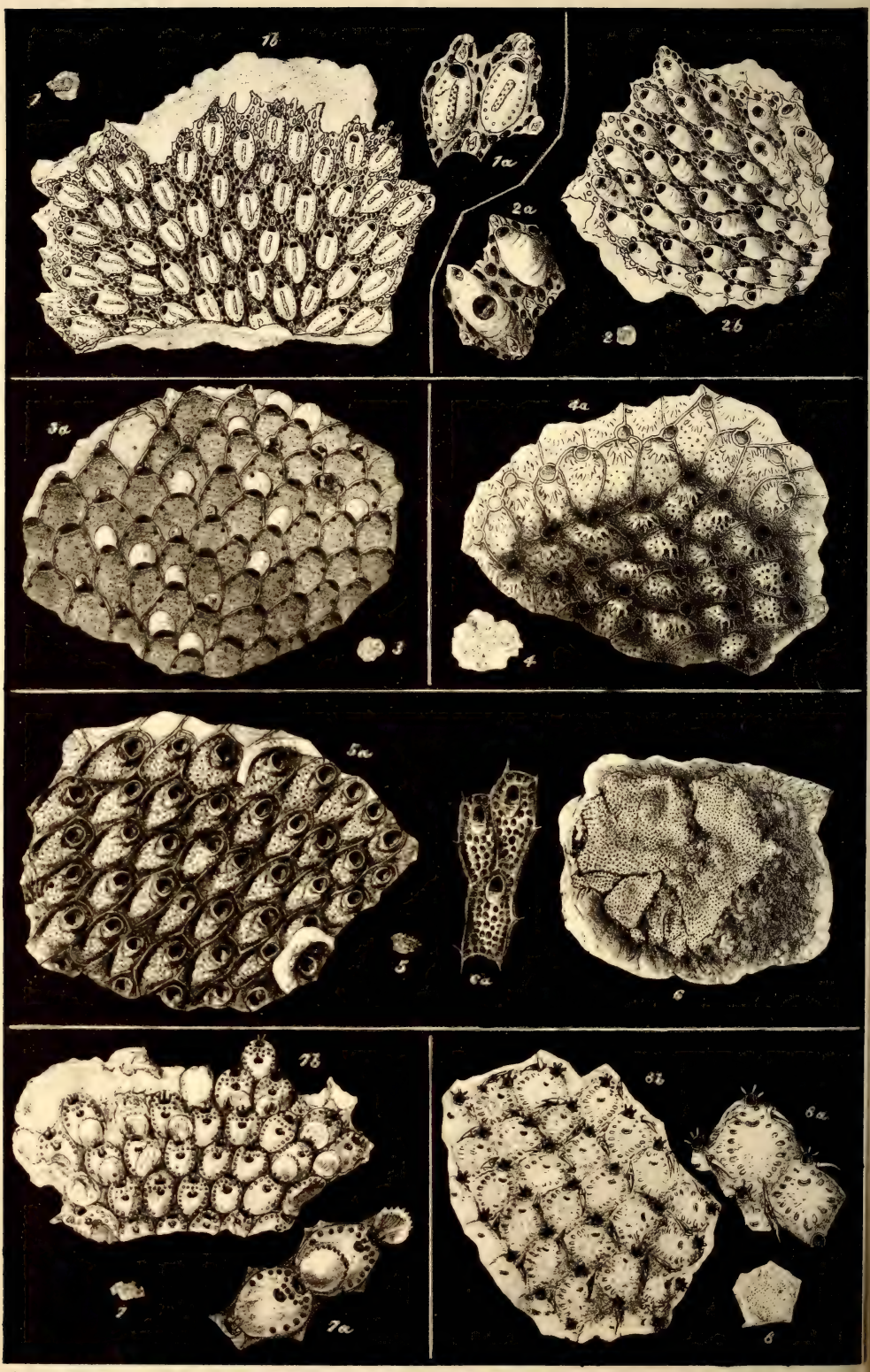


P.H.M.c Gillivray del.
A. Bartholomew lith.

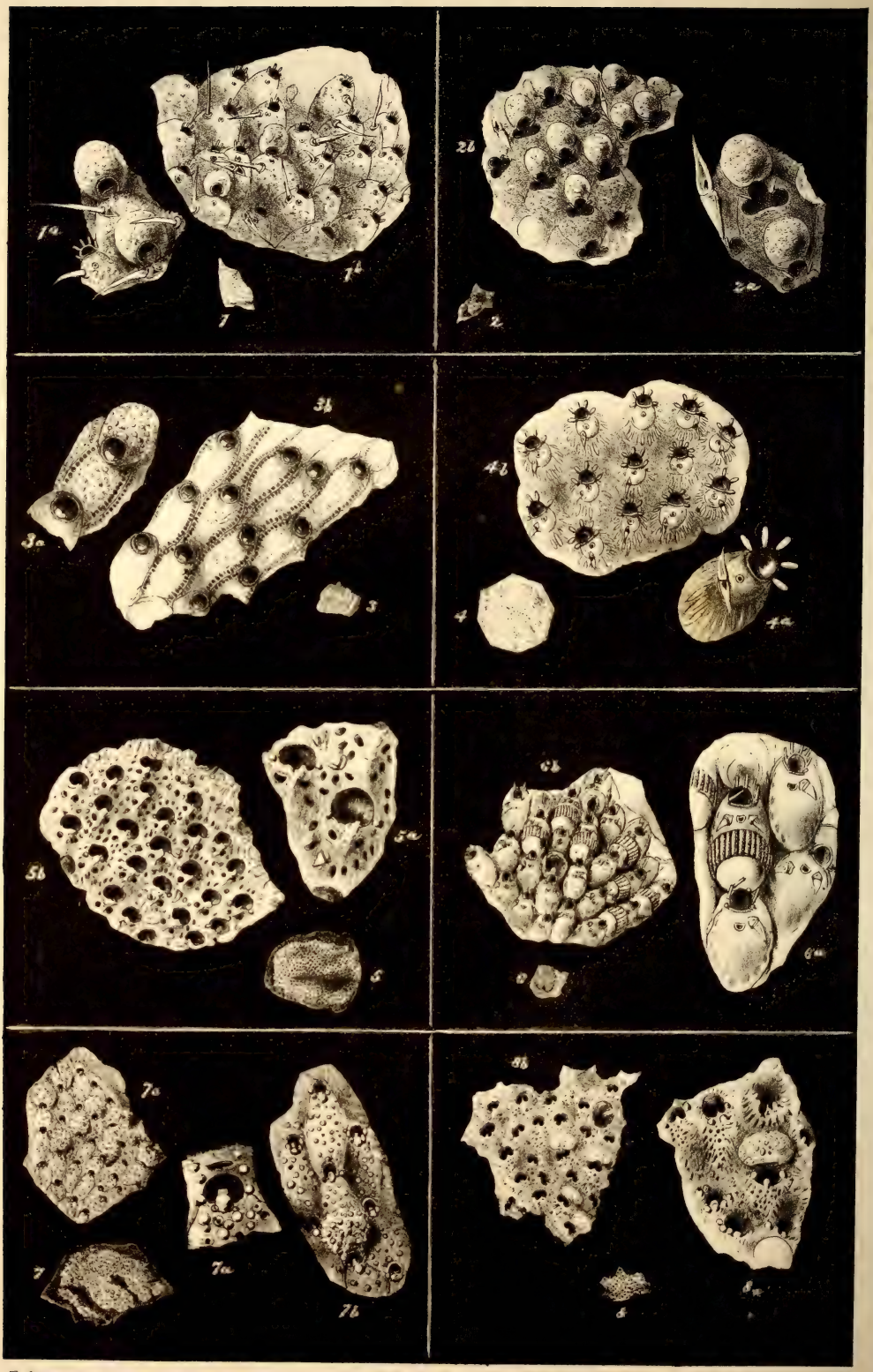
Prof. M.c Coy direx.

C. Troedel & Co. imp.



E. Gilks, del et lith. Prof. M.ᵉ Coy, direct.ᵗ J. M. Ferguson, imp.

Printed at the Mining and Geological Department, Government Printing Office, Melbourne



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J. M. Ferguson. imp.

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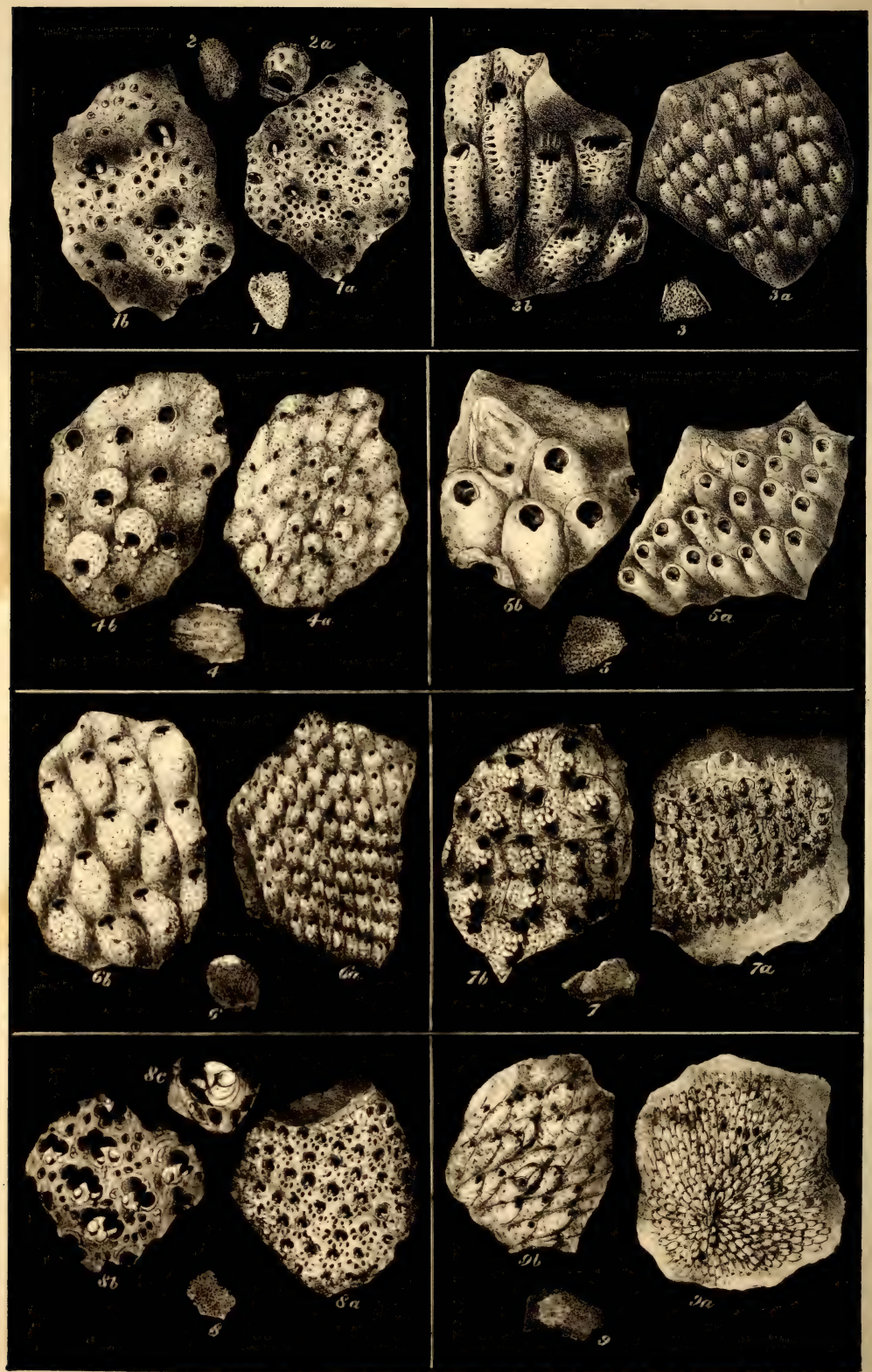

E. Gilks, del et lith. Prof. M.c Coy, direx.t J.M. Ferguson, imp.

Printed at the Mining & Geological Departt Government Printing Office Melbourne.

PLATES 35, 36, 37, 38.

PLATE 35, FIG. 1.

LEPRALIA CIRCINATA (P. McG.).

[Genus LEPRALIA (JOHNSTON). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-order Cheilostomata. Fam. Membraniporidæ).

Gen Char.—Polyzoary adnate, crustaceous or occasionally suberect, calcareous, usually spreading circularly. Cells contiguous or connected, front entirely calcareous.]

DESCRIPTION.—Cells oval, smooth, with a row of stellate pores round the margin and extending above the mouth. Mouth with two or three spines above, lower lip nearly straight with a small notch. Ovicell moderately large, smooth, slightly denticulate on the upper margin.

REFERENCE.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

Queenscliff, on sea-weed.

Allied to *L. Malusii*, from which it differs in the absence of the central lunate pore, in the notch in the lower lip, and the very faint dentation of the ovicell.

EXPLANATION OF FIGURES.

PLATE 35.—Fig. 1, specimen, natural size. Fig. 1*a*, portion, magnified. Fig. 1*b*, small portion, more highly magnified.

PLATE 35, FIG. 2.

LEPRALIA CECILII (AUD.).

DESCRIPTION.—Cells large, distinct, irregularly hexagonal or rounded above, surface perforated, the perforations being arranged in more or less regular lines and usually leaving a clear space down the centre; mouth arched above, straight below, with a large nearly circular sinus. Ovicell large, round, slightly granular.

REFERENCE.—*Lepralia Cecilii*, Busk., Micros. Journal, v. 173; *L. crystallina*, P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

Queenscliff; Warrnambool, Mr. Watts.

In this very beautiful species the cells are of large size, irregular in shape and arrangement. They are distinct and frequently separated by narrow smooth spaces, with occasionally a slightly elevated line. The whole surface, except a narrow space down

the centre, is occupied by small round perforations, arranged in irregular lines and extending above the mouth. Occasionally there is no clear central space. There is sometimes an elevated portion, or umbo, below the mouth, both forms being found in the same specimen. In a specimen contributed to the Museum by Mr. Watts from Warrnambool, the walls are much thickened and porcellaneous, and the whole surface is occupied by large openings, except in a few cells, where there is a small elevated smooth space below the mouth.

Explanation of Figures.

Plate 35.—Fig. 2, specimen, natural size. Fig. 2*a*, portion, magnified. Fig. 2*b*, single cell, more highly magnified. Fig. 2*c*, cell, with ovicell. Fig. 2*d*, single cell and outlines of two others of the porcellaneous form.

Plate 35, Fig. 3.

LEPRALIA DIAPHANA (P. McG.).

Description.—Cells distinct, smooth and diaphanous; mouth arched above, thickened and produced forwards below, with several (sometimes 5 or 6) short spines and usually a very long, jointed one articulated at one side. Ovicell small, globular, smooth.

Queenscliff; Warrnambool, Mr. Watts.

This very peculiar species can be confounded with no other that I have seen. There is a variable number of short spines on the margin of the upper lip, and at one side an excessively long spine, several times the length of the cell and consisting of numerous joints. There is occasionally one of these long spines on each side of the mouth.

Explanation of Figures.

Plate 35.—Fig. 3, specimen, natural size. Fig. 3*a*, portion, magnified. Fig. 3*b*, small portion, more highly magnified.

Plate 35, Fig. 4.

LEPRALIA MARSUPIUM (P. McG.).

Description.—Cells small, distinct, arranged in longitudinal lines; upper part, immediately below the lip, forming a large, rounded, pouch-like projection; mouth with several small spines on the upper margin. Ovicell small, globular.

Reference.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

In this species the cells are of small size and arranged in lines. They are distinct, and the margin is occasionally faintly areolated. It is readily recognised by the large pouch-like dilatation of the upper part of the cell, on which, opposite to and frequently projecting over the centre of the lower lip, is a further rounded protuberance.

EXPLANATION OF FIGURES.

PLATE 35.—Fig. 4, specimen, natural size. Fig. 4*a*, portion, magnified. Fig. 4*b*, small portion, more highly magnified.

PLATE 35, FIG. 5.

LEPRALIA SUBIMMERSA (P. McG.).

DESCRIPTION.—Cells large, irregularly rhomboidal, separated by prominent raised lines, surface granular and perforated ; mouth wide, arched above, slightly hollowed beneath; a short, nearly transverse avicularium on an elevated portion below the lower lip ; ovicell large, subimmersed in the cell above, granular and perforated like the cells.

Warrnambool, Mr. Watts.

EXPLANATION OF FIGURES.

PLATE 35.—Fig. 5, specimen, natural size. Fig. 5*a*, portion, magnified. Fig. 5*b*, small portion, more highly magnified, to show ovicell, mouth, and suboral avicularium.

PLATE 35, FIG. 6.

LEPRALIA ANCEPS (P. McG.).

DESCRIPTION.—Cells large, rhomboidal, separated by prominent raised lines, surface granular and perforated; mouth arched above, lower lip hollowed into a shallow sinus, surface slightly elevated below the mouth. Ovicell large, prominent, projecting beyond the margin of the cell above over the edges of those on either side, surface largely granular aud perforated.

Warrnambool, Mr. Watts.

I have some doubt whether this and the last may not prove to be forms of the same species. In both, the size and surface of the

cells are the same, and they are separated by prominent raised lines. The difference consists in the presence of a suboral avicularium in *L. subimmersa*, which may not be constant, and the different elevation of the ovicell. In *L. subimmersa* it is large, closely incorporated with the cell above, from the surface of which it is slightly raised, while in *L. anceps* it is very prominent, the free margins projecting over the edges of the cells on each side.

EXPLANATION OF FIGURES.

PLATE 35.—Fig. 6, specimen, natural size. Fig. 6*a*, portion, magnified. Fig. 6*b*, small portion, more highly magnified, to show ovicell and mouth.

PLATE 35, FIG. 7.

LEPRALIA MAPLESTONEI (P. McG.).

DESCRIPTION.—Cells ovate, surface perforated; mouth arched above, straight below, with a central, rounded notch, unarmed or with two or three short spines. Ovicell round, with numerous large perforations in the central part, the circumference being occupied by a smooth, thickened rim.

Williamstown, Mr. Maplestone.

In the only two small specimens I have seen, the surface is so much obscured by the ovicells that it is difficult to distinguish the real shape of the cells. The ovicells are very peculiar ; they are round, and the circumference is occupied by a thickened band which extends down each side of the mouth, terminating by forming an arched process projecting over in front of the lower lip and nearly meeting in the centre. A row of large perforations surrounds the ovicell immediately within the thickened rim, and there are other smaller ones in the central space.

EXPLANATION OF FIGURES.

PLATE 35.—Fig. 7, specimen, natural size. Fig. 7*a*, portion, magnified. Fig. 7*b*, small portion, more highly magnified.

PLATE 36, FIG. 1.

LEPRALIA VITTATA (P. McG.).

DESCRIPTION.—Cells ovate, separated by irregularly reticulated spaces; front of cell with a broad vitta commencing below the mouth and extending to near the base of the cell, and a row of small perforations on each side close to the margin; mouth arched above, nearly straight below. A roundish or nearly pyriform avicularium above each cell.

REFERENCE.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

This beautiful species is at once distinguished from all others by the peculiar anterior vitta. The reticulations between the cells are formed by branching tubes.

Two small specimens found on an oyster shell from Western Port.

EXPLANATION OF FIGURES.

PLATE 36.—Fig. 1, natural size. Fig. 1*b*, magnified. Fig. 1*a*, two cells, more highly magnified.

PLATE 36, FIG. 2.

LEPRALIA BROGNIARTII (AUD.).

DESCRIPTION.—Cells elongate-pyriform, separated by reticulated spaces, smooth or longitudinally finely sulcate, transversely ringed; mouth arched above, nearly straight below, the lower lip thickened and projecting forwards. An avicularium above each cell. Ovicell mitriform, obscurely carinate, surmounted by a small avicularium.

REFERENCE.—Busk, Brit. Mus. Cat., p. 65, t. lxxxi.

This is said to be a very variable species. In all the specimens I have seen the cells are separated by reticulated spaces, the reticulations being, as in the last, formed by tubes.

On calcareous nodules from Queenscliff.

EXPLANATION OF FIGURES.

PLATE 36.—Fig. 2, natural size. Fig. 2*b*, magnified. Fig. 2*a*, two cells, more highly magnified, the lower one surmounted by an ovicell.

PLATE 36, FIG. 3.

(This represents a specimen of *Membranipora perforata* in which the cell-walls were very much thickened.)

PLATE 36, FIG. 4.

LEPRALIA ELEGANS (P. McG.).

DESCRIPTION.—Cells diamond-shaped, irregularly oval or hexagonal, separated by a thick raised margin; mouth nearly round, with a slightly thickened lip; front areolated, the areolæ frequently radiating from an elevated portion below the mouth.
REFERENCE.—P. H. MacGillivray, Trans. Phil. Instit. Vict., 1859.

On shells and stones, Williamstown and Queenscliff.

EXPLANATION OF FIGURES.

PLATE 36.—Fig. 4, natural size. Fig. 4*a*, magnified.

PLATE 36, FIGS. 5 AND 6.

LEPRALIA PERTUSA (ESPER. SP.).

DESCRIPTION.—Polyzoary large, adherent, occasionally sub-erect; cells large, elongated, separated by raised margins; surface deeply areolated or pierced with numerous large openings; mouth arched above, straight or hollowed below.
REFERENCE.—Busk, Brit. Mus. Cat., p. 80, t. lxxviii.; lxxix., 1, 2.

A common and very variable species. The cells are very large, separated by narrow, raised lines, and with large perforations, the perforations or areolæ being sometimes more regular and larger along the margins, as in Fig. 6*a*. The mouth varies in shape, being usually nearly round, with the smooth lower lip entire, prominent or with a slight sinus. In some specimens the mouth is deep,

contracted at the middle, the lower lip smooth and slightly prominent, exactly as that part is shown in Busk's figure of *L. pallasiana.*

On piles, old hulks, stones and shells, Hobson's Bay.

EXPLANATION OF FIGURES.

PLATE 36.—Fig. 5, specimen, natural size. Fig. 5*a*, the same, magnified. Fig. 6, another specimen, natural size. Fig. 6*a*, three cells, magnified.

PLATE 36, FIG. 7.

LEPRALIA MALUSII (AUD. SP.).

DESCRIPTION.—Cells irregular in size and disposition, usually broadly ovate and in radiating lines; mouth arched above, straight below, plain or armed with several small spines above; a lunate pore near the middle of the cell, and numerous stellate pores arranged in a single or double row beneath the mouth, and in a single row along each margin. Ovicell large or of moderate size, rounded, encroaching on the cell above, smooth, subgranular or grooved, with the superior margin dentate.

REFERENCE.—Busk, Brit. Mus. Cat., p. 83, t. ciii., 1, 2, 3, 4.

A very beautiful species, distinguished by the lunate central and stellate suboral and marginal pores, as well as the dentate upper rim of the ovicell.

On shells and algæ, Queenscliff.

EXPLANATION OF FIGURES.

PLATE 36.—Fig. 7, natural size. Fig. 7*b*, magnified. Fig. 7*a*, two cells, more highly magnified, showing also an ovicell with its dentate upper rim.

PLATE 36, FIG. 8.

LEPRALIA LUNATA (P. McG.).

DESCRIPTION.—Cells rhomboidal, immersed, with a row of short grooves directed inwards along the margin; mouth straight below, with 4 or 5 spines on the upper margin; a lunate pore below the mouth; a large avicularium on one or both

sides, nearly opposite the suboral pore, directed nearly horizontally outwards, mandible pointed.

REFERENCE.—P. H. MacGillivray, Trans. Phil. Soc. Vict., 1859.

Queenscliff, on mussel shell.

EXPLANATION OF FIGURES.

PLATE 36.—Fig. 8, natural size. Fig. 8*b*, magnified. Fig. 8*a*, two cells, more highly magnified.

PLATE 37, FIG. 1.

LEPRALIA CILIATA (LINN. SP.).

DESCRIPTION.—Cells ovate, granular; mouth straight below, with several, usually 4, spines above; a lunate or roundish pore in front of the cell below the mouth, and a long slender vibraculum on one side. Ovicell large, granular.

REFERENCE.—Busk, Brit. Mus. Cat., p. 73, t. lxxiv., 1, 2; lxxvii., 3, 4, 5.

Port Fairy, Mr. Castwood; Warrnambool, Mr. H. Watts; Queenscliff.

EXPLANATION OF FIGURES.

PLATE 37.—Fig. 1, natural size. Fig. 1*b*, magnified. Fig. 1*a*, small portion, more highly magnified, showing two ovicells.

PLATE 37, FIG. 2.

LEPRALIA TRIFOLIUM (P. McG.).

DESCRIPTION.—Cells distinct, irregular in shape, frequently oval, granular; mouth trifoliate, frequently with a spine on each side of the mouth close to the angle and occasionally two others on the upper margin. Avicularia, when present, situated by the side of the mouth, mandible long, pointed. Ovicell of moderate size, globular, granular.

REFERENCE.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

In young specimens the granulations of the surface are very small, the cell wall very thin, and the cells can be seen to be separated by raised lines.

On shells, stones, and algæ, Queenscliff, Williamstown, and Western Port.

EXPLANATION OF FIGURES.

PLATE 37.—Fig. 2, natural size. Fig. 2*b*, magnified. Fig. 2*a*, small portion, more highly magnified.

PLATE 37, FIG. 3.

LEPRALIA CHEILODON (P. McG.).

DESCRIPTION.—Cells small, oval or elongated, separated by narrow raised lines; surface granular frequently with a row of small areolations round the margins; mouth rounded, lip thickened and with a broad denticle inferiorly. Ovicell globular, granular.

REFERENCE.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

Old specimens become a good deal altered in appearance: the walls are thicker, the tubercles become perforated, and the marginal areolations disappear.

Williamstown, on shells.

EXPLANATION OF FIGURES.

PLATE 37.—Fig. 3, natural size. Fig. 3*b*, magnified. Fig. 3*a*, small portion, more highly magnified.

PLATE 37, FIG. 4.

LEPRALIA CANALICULATA (P. McG.).

DESCRIPTION.—Cells irregular, confused, immersed; mouth large, straight below, arched above, lower lip slightly thickened; 5 or 6 stiff spines on the upper border; a series of grooves extending inwards from the margin towards the clear suboral portion, in the centre of which is a round pore; a single avicularium on one side of the cell.

REFERENCE.—P. H. MacGillivray, Trans. Phil. Inst. Vict., 1859.

Queenscliff, on a mussel shell.

EXPLANATION OF FIGURES.

PLATE 37.—Fig. 4, natural size. Fig. 4*b*, magnified. Fig. 4*a*, a single cell, more highly magnified.

PLATE 37, FIG. 5.

LEPRALIA LARVALIS (P. McG.).

DESCRIPTION.—Cells elongated, confused, pierced towards the base by a variable number of foramina; two large openings about the middle of the cell, with a prominent ridge running between them to the point of the much projecting triangular lower lip; mouth large, arched above, and frequently with a spine on either side at the angle of junction of the upper and under lips. Avicularia large, on the side of a cell below one of the large openings.

REFERENCE.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

On algæ, Williamstown.

EXPLANATION OF FIGURES.

PLATE 37.—Fig. 5, natural size. Fig. 5*b*, magnified. Fig. 5*a*, small portion, more highly magnified.

PLATE 37, FIG. 6.

LEPRALIA DIADEMA (P. McG.).

DESCRIPTION.—Cells broad, distinct; mouth straight below, arched above, with several spines; a central roundish pore below the mouth; the edges of the cell obscurely grooved. An avicularium on one or both sides below the mouth, mandible long and pointed outwards. Ovicell with a broad band of vertical beaded lines round the upper margin.

REFERENCE.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

This very beautiful species may be at once distinguished by the peculiar ovicell, the upper part of which is occupied by a broad band of vertical beaded lines, leaving a lower semicircular space smooth.

On algæ, Williamstown and Queenscliff; Warrnambool, Mr. H. Watts.

EXPLANATION OF FIGURES.

PLATE 37.—Fig. 6, natural size. Fig. 6*b*, magnified. Fig. 6*a*, small portion, more highly magnified.

PLATE 37, FIG. 7.

LEPRALIA PAPILLIFERA (P. McG.).

DESCRIPTION.—Cells ovate, distinct; surface covered with numerous hollow granulations or papillæ; mouth usually with several hollow processes and with the lower lip much produced, frequently a small square denticle inside the mouth. Ovicell large, round, and covered with hollow granulations.

REFERENCE.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

This species is at once distinguished by the whole surface of the cells and ovicells being covered with short, round, irregular papillæ.

On algæ, Williamstown.

EXPLANATION OF FIGURES.

PLATE 37.—Fig. 7, natural size. Fig. 7*c*, magnified. Fig. 7*b*, more highly magnified. Fig. 7*a*, a small portion, highly magnified, showing the mouth of a cell, with a large process on the lower lip, and inside that a square denticle.

PLATE 37, FIG. 8.

LEPRALIA ELLERII (P. McG.).

DESCRIPTION.—Cells large, oblique, distinct; surface cribriform; lower lip thickened and produced into a variable number of processes, frequently a median triangular one and several smaller at the sides; in some cells the median projection has a small avicularium on one side. Ovicell broad, finely granular above.

REFERENCE.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

Williamstown, on algæ and shells; Warrnambool, Mr. H. Watts.

EXPLANATION OF FIGURES.

PLATE 37.—Fig. 8, natural size. Fig. 8*b*, magnified. Fig. 8*a*, a small portion, more highly magnified.

PLATE 38, FIGS. 1 AND 2.

LEPRALIA MONOCEROS (BUSK).

DESCRIPTION.—Cells ovate, indistinct, pierced in front by a variable number of large apertures; mouth arched above, straight below, the lower lip occasionally mucronate. Avicularia scattered by the side of the mouth or between the cells. A large thick articulated vibraculum or spine below the mouth on one side. Ovicell small, roundish, or pyramidal, occasionally surmounted by one or two avicularia.

REFERENCE.—Busk, Brit. Mus. Cat., p. 72, t. xciii., 5, 6.

Queenscliff; Warrnambool, Mr. H. Watts.

EXPLANATION OF FIGURES.

PLATE 38.—Fig. 1, natural size. Fig. 1*a*, magnified. Fig. 1*b*, portion, more highly magnified. Fig. 2, another specimen, natural size. Fig. 2*a*, ovicell, magnified.

PLATE 38, FIG. 3.

LEPRALIA EXCAVATA (P. McG.).

DESCRIPTION.—Cells immersed, elongated, running in lines; elongated areolæ round the margins, leaving a narrow smooth surface in front; mouth nearly vertical to the plane of the polyzoary, its upper border armed with 4 straight stiff spines, the lower lip with a deep notch, inside the bottom of which is usually a small simple denticle.

REFERENCE.—P. H. MacGillivray, Trans. Phil. Inst. Vict., 1860.

Queenscliff, on mussel shell.

EXPLANATION OF FIGURES.

PLATE 38.—Fig. 3, natural size. Fig. 3*a*, magnified. Fig. 3*b*, small portion, more highly magnified.

PLATE 38, FIG. 4.

LEPRALIA VITREA (P. McG.).

DESCRIPTION.—Cells oval or irregularly diamond-shaped, separated by a raised line; surface granular; two short, blunt, hollow processes below the mouth; mouth lofty, margin slightly thickened, under lip with a shallow sinus. Ovicell round, granular.

Williamstown.

EXPLANATION OF FIGURES.

PLATE 38.—Fig. 4, natural size. Fig. 4*a*, magnified. Fig. 4*b*, more highly magnified.

PLATE 38, FIG. 5.

LEPRALIA MEGASOMA (P. McG.).

DESCRIPTION.—Cells large, distinct, oblique; surface smooth or obscurely grooved; mouth large, edges thickened, lower lip with a shallow notch.

REFERENCE.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

Queenscliff, on a mussel shell.

EXPLANATION OF FIGURES.

PLATE 38.—Fig. 5, natural size. Fig. 5*a*, magnified. Fig. 5*b*, small portion, more highly magnified.

PLATE 38, FIG. 6.

LEPRALIA SCHIZOSTOMA (P. McG.).

DESCRIPTION.—Cells elongated, distinct, arranged in lines; surface granular, granulations usually larger and closer about the middle of the cell; mouth semicircular above, lower lip straight, with a deep narrow slit in the middle. Ovicell large, granular.

REFERENCE.—P. McGillivray, Trans. Roy. Soc. Vict., 1868.

In old specimens the walls are very thick, covered with close thick granulations, and the projecting part below the mouth is very marked and forms a large rounded granular mass.

Williamstown and Queenscliff, on shell.

EXPLANATION OF FIGURES.

PLATE 38.—Fig. 6, natural size. Fig. 6*a*, magnified. Fig. 6*b*, more highly magnified.

PLATE 38, FIG. 7.

LEPRALIA BOTRYOIDES (P. McG.).

DESCRIPTION.—Cells irregular in shape, separated by a narrow, raised line; mouth hollowed below; surface granular; a cluster of blunt, hollow tubercles below the mouth.

Williamstown.

EXPLANATION OF FIGURES.

PLATE 38.—Fig. 7, natural size. Fig. 7*a*, magnified. Fig. 7*b*, more highly magnified.

PLATE 38, FIG. 8.

LEPRALIA FEROX (P. McG.).

DESCRIPTION.—Cells confused, coalescent; front pierced with several large apertures; mouth large, with one to three small denticles on one side; lower lip occupied by a large avicularium.

REFERENCE.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

This species forms small thick layers, encrusting algæ. The cells are quite undistinguishable. The mouth is very large, and usually has on one side two or three small denticles. The lower lip forms a large projecting mucro, hollowed on one side for an avicularium, and rounded on the other, from which also frequently projects a mamilliform process. The avicularium faces that side of the cell-mouth on which the sharp denticles are situated. In some specimens there are two or three short rounded processes on the upper lip.

On algæ, Williamstown and Queenscliff.

EXPLANATION OF FIGURES.

PLATE 38.—Fig. 8, natural size. Fig. 8*a*, magnified. Fig. 8*b*, more highly magnified. Fig. 8*c*, an avicularium on the lower lip (not quite accurate).

PLATE 38, FIG. 9.

LEPRALIA PELLUCIDA (P. McG.).

DESCRIPTION.—Cells small, elongated, of various shapes, usually fusiform or pyriform, distinct; surface smooth or slightly wrinkled transversely; mouth nearly circular, with a shallow notch inferiorly. Ovicell mitriform, with a projecting ridge, running vertically down the middle.

A small transparent species, occurring rarely on algæ and shells. It very much resembles *L. hyalina* (also Victorian), from which it may be distinguished by the difference in the ovicells.

Williamstown and Queenscliff, on algæ.

EXPLANATION OF FIGURES.

PLATE 38.—Fig. 9, natural size. Fig. 9*a*, magnified. Fig. 9*b*, more highly magnified.

I am indebted for the descriptions and the authentic specimens here figured of our native species of *Lepralia* to my friend, Mr. P. H. MacGillivray. All the types have been placed in the National Museum.

FREDERICK MCCOY.

2c
2a
2b
2
1b
1
1a
3c
3b
3a
3
5a
5
5c
5d
5b
4b
4a
4

Plate 39, Fig. 1.

CRISIA EDWARDSIANA (D'Orb. sp.).

[Genus CRISIA (Lamx.). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-order Cyclostomata. Fam. Crisiidæ.)
Gen. Char.—Two or more cells in an internode.]

Description.—Cells 2–3 in an internode, sparsely punctate, much elongated, upper part free and projecting forwards; mouth circular. A long, jointed spine articulated to one of the cells of an internode. Cells distinct on the back. Ovicell large, nearly round or pyriform.
Reference.—*Crisidia Edwardsiana*, D'Orbigny, Voy. dans l'Amer. Mér. v. 8, t. i. 4–8.

Williamstown.

The cells are arranged in pairs, except in those internodes where a branch is given off, when there are three, the branch springing from the lowest. They are much elongated, narrow, and for a large extent, frequently nearly a half, free and turned abruptly forwards. A long, hollow, jointed spine is attached to the outer and posterior part of one, or occasionally of each cell, at or immediately above the point where it turns forwards. The joints of the polyzoary and spines are black.

Explanation of Figures.

Plate 39.—Fig. 1, natural size. Fig. 1*a*, front of branchlet, magnified, showing ovicell. Fig. 1*b*, back, magnified.

Plate 39, Fig. 2.

CRISIA BICILIATA (P. McG.).

Description.—Cells 2–3 in an internode, punctate, elongated, upper part free and projecting forwards; mouth circular. A pair of long, jointed spines articulated to the outer part of each cell, except to those bearing the secondary branches, a short distance below the mouth. Cells distinct at the back. Ovicells of moderate size or small, much elongated, nearly elliptical in outline, situated at the angle of a bifurcation.
Reference.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

Williamstown, Mr. Maplestone ; Warrnambool, Mr. Watts.

The aspect and general arrangement of the cells are the same in this species as in the last. There are two cells in each internode, and three in those from which the branches originate. The cells are shorter, wider superiorly, and the free part is not so long ; the ovicell is smaller, more elongated, and situated in the angle between the branches ; and each cell, in the typical form, has two long, jointed, articulated spines. One or both spines are frequently broken off, but in that case the mark of the articulation can generally be seen. Occasionally in some or all the cells, in uninjured specimens, there is only one spine. The shorter and wider cell, however, the spine originating nearer the less projecting mouth, and, when present, the smaller and narrower ovicell, are sufficiently distinctive. The joints also are light-colored.

I am doubtful to which species Busk's description and figures of *C. Edwardsiana* refer. The figures have the proportions of the cells of *C. biciliata*, and may have been taken from an imperfect specimen of the single-spined form. The ovicell, however, is differently shaped.

Explanation of Figures.

Plate 39.—Fig. 2, natural size. Fig. 2*a*, front of branchlet, magnified. Fig. 2*b*, back, magnified. Fig. 2*c*, ovicell, magnified.

Plate 39, Fig. 3.

CRISIA ACROPORA (Busk).

Description.—Cells 9–13 in an internode, closely adnate throughout, surface minutely punctate; mouth nearly circular, the outer rim prolonged into a short pointed denticle. Ovicell large, pyriform, frequently annulated. Branches usually given off from the second cell, occasionally higher.

Reference.—Busk, Voy. Ratt. i. 351 ; Cat. Mar. Pol. Brit. Mus. pt. iii. p. 6. pl. v. 3, 4.

Williamstown and Queenscliff.

The only Australian species with which this can be confounded is *C. margaritacea* (Busk), of which I have specimens from Queenscliff, but found too late for illustration in the present plate. It is

readily distinguished by the submarginal denticle at the back of the mouth. It is very closely allied to the European *C. denticulata.*

Explanation of Figures.

Plate 39.—Fig. 3, natural size. Fig. 3*a*, front view, magnified, showing an ovicell on a twisted branch. Fig. 3*b*, back, magnified. Fig. 3*c*, ovicell.

Plate 39, Fig. 4.

CRISIA SETOSA (P. McG.).

Description.—Cells 4–10 in an internode, minutely punctate, elongated, the upper part projecting slightly; mouth circular. A single long, slender, jointed spine articulated to a projection immediately below and behind the mouth. Branches given off irregularly. Joints brown.

Reference.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

Williamstown and Queenscliff.

This differs from all the other described multicellular species in the presence of the articulated spine.

Explanation of Figures.

Plate 39.—Fig. 4, natural size. Fig. 4*a*, specimen, magnified. Fig. 4*b*, another specimen, magnified, showing an abortive internode.

Plate 39, Fig. 5.

CRISIA TENUIS (P. McG.).

Description.—Cells 6–13 in an internode, much elongated, slender, closely adnate in great part of their length, minutely punctate, upper part free and turned forwards; mouth circular, unarmed. Branches given off irregularly, occasionally more than one from an internode. Ovicell small, nearly globular or pyriform, situated on the front of an internode at a bifurcation.

Queenscliff, growing on the roots of algæ.

A very distinct, small, slender, delicate species.

Explanation of Figures.

Plate 39.—Fig. 5, natural size. Fig. 5*a*, specimen, magnified. Fig 5*b*, young specimen, magnified. Fig. 5*c*, portion, showing ovicell.

The beautiful drawings, as well as the original specimens and descriptions of the above species of *Crisia*, all that are at present known with certainty on the Victorian shores, have been contributed to this work by Mr. MacGillivray. I carefully supervised the lithographing of the figures, which I thought would be found all that the observer could require ; but unfortunately the plate, which was well executed by the excellent lithographic artist employed, has been so greatly damaged at the last moment that it is intended to re-issue it at a future time.

FREDERICK MCCOY.

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PLATE 40.

THE CASE-MOTHS.

The extraordinary insects figured on this plate are amongst the most curious and striking of the "common objects" in Australia, meeting the eye everywhere, from the abundance of the conspicuous protecting sacks or cases which the larvæ construct and carry about with them, hanging to the trees in all directions, fixed by the uppermost anterior end and swinging loose otherwise. In structure of the female and in habit they are the most abnormal and singular of all Lepidopterous Insects: the females being thick, smooth, naked, fleshy, grub-like creatures, totally destitute of wings, and having only minute rudimentary traces of legs, antennæ, or eyes. These apterous females never leave the sack or case in which they dwelt while in the larva state, but after meeting the males at the lower aperture of the case commence to bring forth the young in myriads; these escaping in crowds let themselves down each by a silk thread spun from the lower lip until they reach a twig or leaf, and then immediately begin to construct each a separate case of tough silk and extraneous materials, such as particles of bark, &c., to protect it during the period of its larval existence. These larval sacks or cases are open at each end, the caterpillar coming sufficiently out of the anterior aperture to use its three pairs of thoracic legs for locomotion when feeding, usually fixing a part of the edge of the aperture by fibres of silk temporarily to the twig it is on, so that if alarmed it can suddenly withdraw completely within the case, which then remains hanging with the apertures so completely closed that, if the nature of the object was not known, it would never be suspected to contain a vigorous voracious larva. A young friend, walking with me in Richmond Park the first evening I arrived in the colony, collected a number of these cases from the

trees, and as they were too strong and tough to be opened, and were perfectly closed, it was taken for granted they were cocoons containing pupæ only, when put in his pocket; and no more was thought of the matter until they created a commotion in the drawing-room soon after by crawling actively out over the head and dress of my inquisitive friend; none of the older residents in the room having ever seen the living larvæ, or suspected their existence in the well-known cases—so vigilant and timid are the caterpillars in retreating at the approach of danger. A curious mistake is made by Mr. Westwood in describing the emergence of the male pupæ from the "apex" of the cases of some species allied to the present one. The fact is that the escape is always from the base or posterior aperture of the case, and not from the "apex" or anterior aperture, through which the head of the larvæ protrudes when walking or feeding. In both sexes the larva, when full grown and about to assume the pupa state, closes up the anterior aperture of the case and fastens it firmly to a branch or trunk of a tree; the male larva then turns itself upside down and assumes the pupa condition with its head where its tail used to be, close to the posterior or lower unattached end of the case, through the opening of which, when the time for emergence of the moth arrives, it pushes the anterior half of its length, by a slight elongation and contraction of the body, which, from the backward inclination of some small sharp spines on some of the rings, is in this way forced out head foremost, in the same manner as the pupæ of the Goat-moths and the large Swifts are made to emerge from the timber and the earth when the moth is about to escape, and leaving similarly the empty pupa skin sticking half out of the case. As the females never leave the case, they do not turn over like the males, but assume the pupa state with the head up, in the same position they occupied as larvæ, and with the posterior end of the abdomen close to the aperture in the posterior or lower free end of the case. I have no doubt that a very curious observation of Mr. Kershaw, one of the Taxidermists in the Melbourne National Museum, is perfectly true as applied to some at least of the species of these Case-bearing Moths, namely, that *the female imago never emerges from the pupa case at all*, but this hardened covering splitting open for a short

distance at the posterior end allows of all the functions necessary for the continuance of the species, and immense numbers of young are brought forth, not in the egg state, as hitherto supposed for all moths, but as exceedingly minute perfect larvæ. In confirmation of this unexpected discovery, I may mention that no eggs are ever found in the cases of the species observed in this colony, and the myriads of young produced by each female may be observed emerging in a continuous stream as minute larvæ, under circumstances which render it impossible to suppose that eggs could have been deposited.

The males of all the Case-Moths, unlike the females, are swift flyers of most extraordinary activity, dashing themselves almost to pieces as soon as they emerge, and they are remarkable also for the unusual elongation of the narrow abdomen, which they lash about and elongate in a most surprising manner. All the species are singularly rare in the moth state considering the abundance of the cases, not one in a hundred of which will be found to produce a moth, the others either dying or being attacked by several species of Ichneumon and also Dipterous parasites.

PLATE 40, FIGS. 1–6.

METURA ELONGATA (SAUNDERS SP.).

SAUNDERS' CASE-MOTH.

[Genus METURA (WALK.). (Sub-kingd. Articulata. Class Insecta. Order Lepidoptera. Section Heterocera. Tribe Bombycites. Fam. Psychidæ.)

Gen. Char.—Male.—Body robust. Head, thorax, and abdomen densely hairy. Palpi short, inconspicuous. Antennæ shorter than the thorax, about 40 jointed, widely bipectinated below, serrated towards the apex. Abdomen long, capable of great elongation, extending at least half its length beyond the posterior wings. Legs strong, anterior pair longest, with long spines to their tibiæ; thighs and tibiæ densely pilose. Wings anterior, very narrow, pointed, straight along front edge, external margin very oblique; the usual twelve marginal veins are third and fourth subcostals (2^c and 2^d) at the apex, converge into a fork before the base reaches the upper exterior angle of the discoidal cell, where it joins the next or fifth subcostal (2^c); the next simple upper discoidal branch (x) extends from the middle of end of the discoidal cell; the lower discoidal vein (y) joins the next median vein (3^c) as a fork, the base of which, and the next two simple branches* (3^b and 3^a), join the discal areolet, which is divided longitudinally by a branching vein

* On one side in the figured specimen of *Metura elongata* the branch 3^b is forked, but the corresponding one on the other side has the normal simplicity.

Posterior wing small, very acute at the point, with a deep sinus in posterior margin from anal portion, which extends into a prominent rounded lobe; one superior vein; discal areolet divided by a forked vein; lower discoid (y) unites into a fork with the third branch of the median (3^c); submedian and internal veins distant, curved parallel.

Female.—Short, cylindrical, soft, nearly naked, without wings; eyes small; legs very minute; antennæ very short, unjointed; last two joints of abdomen slightly pilose.

Case for larvæ and female elongate fusiform, of strong silk within and added twigs on outside.

Description.—*Male.*—Wings sooty-black, slightly hyaline, veins testaceous; anterior half of thorax, head and breast, end of abdomen, under side of last 5 abdominal joints, and a narrow margin to the hinder abdominal segments fulvous orange; rest of thorax and abdomen velvety-black; front of head, antennæ, and legs blackish-brown, the anterior legs banded with fulvous orange. Length when at rest, about 11 lines (but capable of extending the abdomen to nearly 2 inches); from tip to tip of anterior wings, 1 inch 10 lines; pectinated portion of antennæ nearly 2 lines, serrated apical portion slightly less. There are about 15 branches on one side and 18 on the other on the bipectinate portion of each antenna, and about 19 serrated joints beyond.

Female.—Pale brownish cream-color, head and thoracic segments light-brown, fleshy, smooth, the last two or three joints fringed with scanty hairs; legs very minute, antennæ nearly obsolete, scarcely visible to the naked eye. Length, about 1 inch 6 lines; width, about 5 lines.

Larva.—Head and thoracic segments black, mottled with pale testaceous brown; rest of body dull hazel-brown. Length of female, about 2 inches; width, 5 lines. Male similar, but about one-third less.

Case.—Fusiform, of tough brownish-grey silk set with numerous irregular rows of rather distantly separated subalternate small twigs, rather less than 1 line in diameter, and varying from ½ inch to 1 inch in length, except at the posterior end, where several of them are 3 or 4 inches long. Length of case of male, about 4 inches; greatest width at middle, about 9 lines. Female case, one-third larger.

Reference.—*Oiketicus elongatus* (Saunders), Tr. Ent. Soc., v. 5, p. 43; = *Oiketicus Saundersi* (Westw.), Proc. Zool. Soc. 1854, p. 223, t. 35.

The larvæ and cases of this species far exceed any of the others in size, and when, as last year, they are unusually abundant they attract the attention of the most incurious observer. The larvæ are found indifferently not only on a great variety of native trees, but on a singular variety of imported foreign trees and shrubs in the gardens round Melbourne. The size of the Victorian specimens is slightly less than that of the New South Wales examples, but I do not think there is any specific difference.

Explanation of Figures.

Plate 40.—Fig. 1, male, natural size. Fig. 2, male larva, with case, natural size. Fig. 3, larva of female, viewed from above, natural size. Fig. 4, ditto, side view, removed from case. Fig. 5, outline of anterior wing, magnified, to show the different veins lettered and numbered as in the above generic character. Fig. 6, one of the antennæ, magnified, to show the wide bipectinate basal half and narrow serrated distal half.

PLATE 40, FIGS. 7–15.

ENTOMETA IGNOBILIS (WALK.).

THE LICTOR CASE-MOTH.

[Genus ENTOMETA (WALK.). (Sub-kingd. Articulata. Class Insecta. Order Lepidoptera. Sect. Heterocera. Tribe Bombycites. Fam. Psychidæ.)

Gen. Char.—Male.—Body stout, very pilose. Head moderately prominent. Palpi very stout, pilose, projecting a little beyond the head; third joint minute, conical. Antennæ longer than the thorax, deeply bi-pectinated to the tips. Abdomen extending beyond the hind wings. Legs stout, pilose; hind tibiæ with small apical spurs. Wings pilose, nearly opaque; anterior pair rather long, narrow towards the rounded tips, straight along the costa; exterior border very oblique, slightly excavated; inner angle rounded, obtuse; hind wings obliquely rounded, without sinus. *Female* without wings or legs. Australia and Tasmania.]

DESCRIPTION.—*Male.*—Brown. Wings smoky-brown, slightly hyaline with a small dark spot at end of disc on upper wings; anterior ones acute, exterior border nearly straight, very oblique. Head, thorax, legs, and abdomen dull ochraceous; palpi whitish; tip of tail darker brown. Palpi porrect, not extending beyond the head. Antennæ slightly longer than thorax, broadly bipectinated, gradually narrowing to the apex. Length of body, 9 lines; expanse from tip to tip of wings, 1 inch 4 lines. Pupa dark-brown, slender, with wings, &c., marked; length, 10 lines; width, 3 lines.

Female.—Short, fusiform, thick; cream-colored, except the thoracic segments and head, which are brown; surface naked, except a slight pilose fringe on hind segments. Length, 11 lines; diameter, 5 lines. Pupa nearly the same size and shape but dark-brown, with blackish transverse bands; the stigmata on the sides very distinct.

Case of male formed of a flexible tubular portion covered with small grains of bark, &c., from $\frac{1}{4}$ to $\frac{1}{2}$ an inch long, and 3 lines wide in front and behind; the middle portion like a cylindrical bundle, $\frac{1}{2}$ an inch in diameter, of straight sticks, each about 1 line in diameter, rounded at the cut ends, each firmly fixed by the whole inner side to the silk lining of the case; the twigs are about 1 inch long, but one or two usually much longer at the posterior end (apparently for the legs of the imago to lay hold of when drawing itself out of the pupa skin). Case of female of about fourteen sticks, $1\frac{1}{2}$ inch long and 8 lines in diameter.

REFERENCE.—Walker, Char. Undescr. Lepidop. Heteroc., p. 67.*

The cases of this species are so excessively abundant that scarcely a tree in the colony can be found without many of them hanging from it. They chiefly frequent the *Eucalypti* or so-called

* I may mention that the *Entometa despecta* described in the above work has really no relation to this genus. The larvæ have no case, and in size and shape resemble those of the English "Drinker-moth," *O. potatoria*, with two filaments from the third segment and a conical projection like that of a Hawk-moth from the penultimate segment; and the females are large, with well-developed legs and wings, much larger than those of the male; the cocoons are of white silk, with leaves or grass on the outside.

Gum-trees, but are also common on many others of the most diverse botanical characters. At least ten thousand of this species can be found to one of any of the other of the Case-Moths or House-builder Moths as they are often called. The name Lictor-Moth is suggested by the resemblance of the case to the fasces or bundles of rods borne by the Lictors of old before the Roman magistrates.

All the summer the larvæ are found feeding. The smaller cases, which belong to the males, are often seen to have the empty pupa case sticking rather more than half out of the posterior tubular aperture, beyond the bundle of sticks, hanging head downwards. From the larger female cases, in February, multitudes of young larvæ, about 1 line in length, may be seen descending by long slender threads of silk emitted from the lower lip, thus escaping from the lower tubular aperture of the case, and reaching some twig or leaf of the tree. They immediately begin to spin a silk-case for themselves, fastening grains of wood or bark into its outer surface ; the young larvæ have only this flexible covering until a considerable size is obtained, when the larva chooses and cuts about one inch in length of a slender bit of straight twig, fastening one end of it to the case, then another, and so on until the ordinary number of rods are strung by the upper end round the case ; these are ultimately fastened in the whole length as the larva reaches the full size. The perfect insects have not been figured before, and are surprisingly difficult to procure, owing to the destructive effects of the attacks on the larvæ of several species of Ichneumon and Dipterous parasitic Flies.

Explanation of Figures.

Plate 40.—Fig. 7, male, natural size. Fig. 8, larva and case of female, natural size. Fig. 9, case of male with empty pupa (sticking out), from which the perfect moth has emerged, natural size. Fig. 10, case of adult perfect female, with strings of young larvæ escaping. Fig. 11, adult perfect female, natural size. Fig. 12, female pupa, natural size. Fig. 13, male pupa, natural size. Fig. 14, anterior wing, magnified, showing the different veins numbered as in the preceding species. Fig. 15, hinder wing, showing veins and the long bristle from base of anterior border to connect with loop of anterior wing. Fig. 16, one of the antennæ, magnified to show the number and gradual diminution towards apex of the pectinations.

The branch (y), which is assumed in this genus to be absent, is, on one side of the specimen figured on our plate, extended half way from the disc to the margin.

Frederick McCoy.

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Natural History of Victoria.

PRODROMUS

OF THE

ZOOLOGY OF VICTORIA;

OR,

FIGURES AND DESCRIPTIONS OF THE LIVING SPECIES OF ALL CLASSES

OF THE

VICTORIAN INDIGENOUS ANIMALS.

DECADE V.

BY

FREDERICK McCOY, F.R.S.,

HONORARY FELLOW OF THE CAMBRIDGE PHILOSOPHICAL SOCIETY; HONORARY ACTIVE MEMBER OF THE IMPERIAL SOCIETY OF NATURALISTS OF MOSCOW; CORRESPONDING MEMBER OF THE ZOOLOGICAL SOCIETY OF LONDON; HONORARY MEMBER OF SEVERAL OTHER SCIENTIFIC SOCIETIES, ETC.
PROFESSOR OF NATURAL SCIENCE IN THE MELBOURNE UNIVERSITY.
DIRECTOR OF THE NATIONAL MUSEUM OF NATURAL HISTORY AND GEOLOGY OF MELBOURNE, ETC.

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M DCCC LXXX.

ERRATUM.

Pages 11 and 12, and on Contents of Decades, *for* "LYMNODYNASTES" *read* "LIMNODYNASTES."

PREFACE.

It having been considered desirable to ascertain accurately the natural productions of the Colony of Victoria, and to publish works descriptive of them, on the plan of those issued by the Governments of the different States of America, investigations were undertaken, by order of the Victorian Government, to determine the Geology, Botany, and Zoology of the Colony, to form collections illustrative of each for the public use, and to make the necessary preparations for such systematic publications on the subject as might be useful and interesting to the general public, and contribute to the advancement of science.

As the geological and botanical investigations have already approached completion, and their publication is far advanced, it has been decided to now commence the publication of the third branch completing the subject, namely, that of the Zoology or indigenous members of the different classes of the animal kingdom.

As the Fauna is not so well known as the Flora, it was a necessary preliminary to the publication to have a large number of drawings made, as opportunity arose, from the living or fresh examples of many species of reptiles, fish, and the lower animals, which lose their natural appearance shortly after death, and the true characters of many of which were consequently as yet unknown, as they had only been described from preserved specimens. A Prodromus, or preliminary issue, in the form of Decades, or numbers of ten plates, each with its complete descriptive letterpress, will be published, of

such illustrations as are ready, without systematic order or waiting for the completion of any one branch. The many good observers in the country will thus have the means of accurately identifying various natural objects, their observations on which, if recorded and sent to the National Museum, where the originals of all the figures and descriptions are preserved, will be duly acknowledged, and will materially help in the preparation of the final systematic volume to be published for each class when it approaches completion.

This fifth Decade gives figures and descriptions in the first plate of the largest of the Victorian Reptiles, the Lace Lizard, or Coast Lizard, or Iguana as it is often called erroneously.

The second plate figures, for the first time in the natural colors, two of our more curious Frogs, one remarkable for its habit of burying itself underground during the day in waterless localities to avoid the scorching rays of the sun, but coming on the surface during the dewy nights, furnishing welcome food to the nocturnal snakes of those regions.

The third plate shows the characters of two of the more interesting Sharks of our coast.

The fourth plate gives evidence of the identity of the Tunny and the Barracouta of our waters with those of Europe and South Africa respectively.

The fifth to the ninth plates continue the illustrations of our Polyzoa, in which the Victorian waters are proving richer than any other part of the world, and in which, as before, I have had the assistance of my friend, Dr. MacGillivray, who has presented all his specimens here described to the National Museum for reference.

The tenth plate illustrates the characters of two species of those most interesting insects, the *Cicadæ*, one of them being the producer of the Australian Manna from the *Eucalyptus viminalis*, which it frequents.

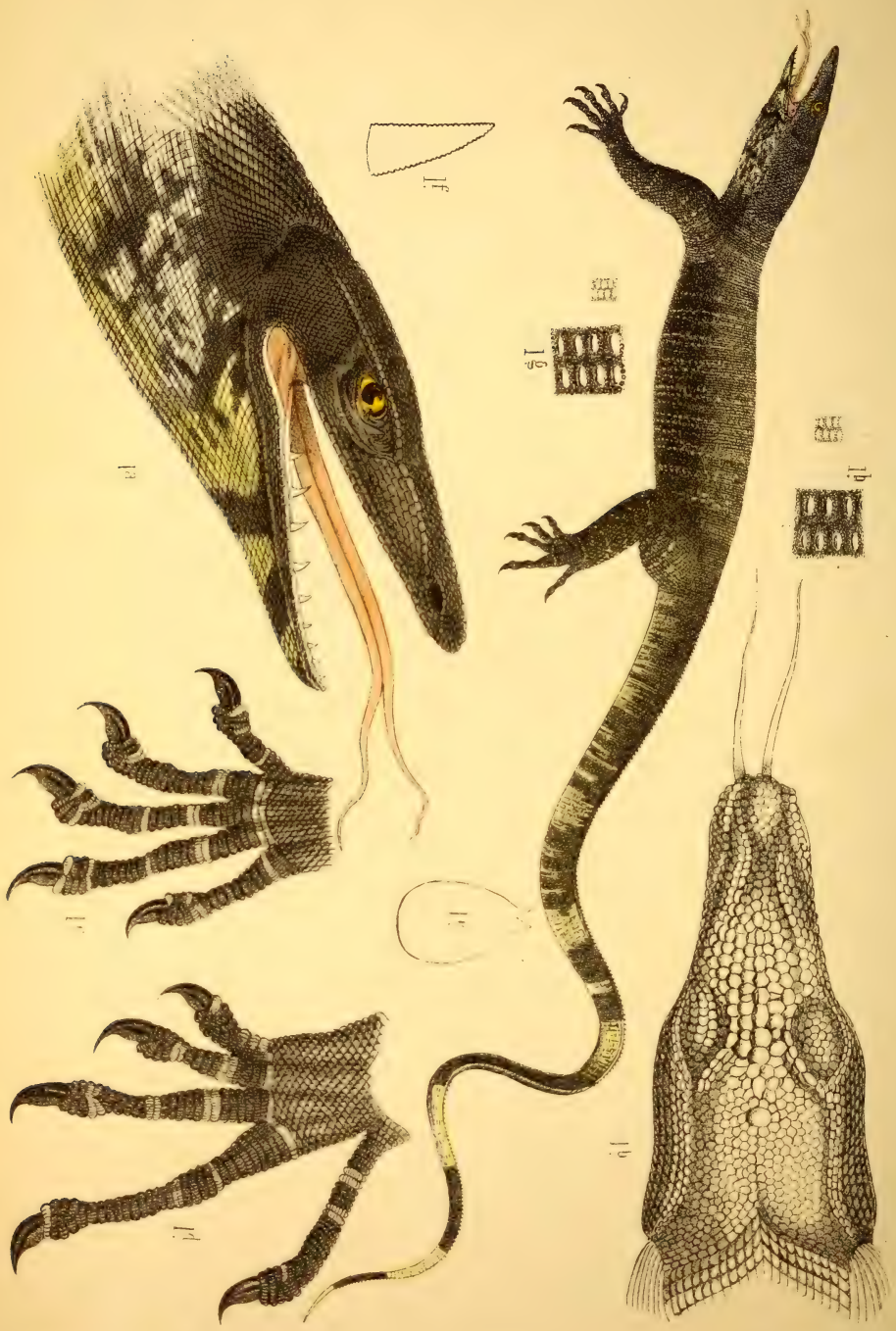
The succeeding Decades will illustrate as many different genera as possible, and will deal first usually with species of some special interest, and of which good figures do not exist, or are not easily accessible.

FREDERICK MCCOY.

19th June 1880.

Pl 4

ZOOLOGY OF VICTORIA
(Reptiles)



F. Schoenfeld del. & lith. *Prof. McCoy, dirext* *Hamel & Co. imp.*

PLATE 41, FIG. 1.

HYDROSAURUS VARIUS (SHAW SP.).

THE LACE LIZARD.

[Genus HYDROSAURUS (WAGLER). (Sub-kingd. Vertebrata. Class Reptilia. Order Sauria. Sub-Order Leptoglossæ. Fam. Monitoridæ.)

Gen. Char.—Nostrils longitudinally oval, near the tip of sides of muzzle; tail long, slender, compressed, with a small double dorsal keel of 2 longitudinal rows of scales a little larger than those of sides. Toes long, slender, unequal, separate, terminated each by a large, short, curved claw. Teeth lodged in a furrow in the jaws (none on the palate), compressed, the two edges serrated. Scales small, granular, not imbricated, each surrounded with smaller granules. Australia and Asia.]

DESCRIPTION.—*Form:* body very elongate, ovate, slightly depressed; tail very long, moderately compressed; head oblong, flattened above, with nearly vertical sides tapering to the semielliptically rounded muzzle; nostrils near the tip of snout, longitudinally oval; a laterally-projecting ridge over each eye; plates about the orbit very small, subequal. *Teeth:* about 10 or 11 on each side in each jaw, the middle ones largest; triangular, gently arched backwards, very much compressed, the sharp anterior and posterior edges very finely serrated. *Scales:* small, convex, oval, surrounded with granules, those of head polygonal, small, subequal; those of superciliary ridge very small, subequal. *Color:* all above coal-black, the body with about a dozen transverse bands of short, interrupted, transverse lines of pale yellow, about a scale wide, the bands varying from 2 to 10 scales wide irregularly, with usually a few large, irregular yellow blotches, about 3 scales long and wide on the back; the anterior legs and toes have irregular bands of yellow scales of very varying width and disposition, the hinder legs having the yellow disposed more in the form of transverse rows of spots; about 3 or 4 strongly marked black bands across the throat, with the intervening broad spaces bright chrome-yellow, behind which, on lower part of neck, the light parts are tinted with cobalt-blue; iris yellow; tail with very variable, transverse, narrow, yellow lines until near the extremity, where one or two patches, 30 to 50 scales long, are usually nearly or quite uninterrupted yellow, a variable length of the tip of the tail being usually also of the same color; on underside the pale yellow preponderates over the narrow, irregular, black markings.

The following are the measurements of the young, figured specimen, and one of average size:—

Measurements.	Young, figured, Specimen.			Average-size Specimen.		
	ft.	ins.	lines.	ft.	ins.	lines.
Total length	2	10	6	5	0	0
Length of tail	1	9	6	3	1	0
„ of head	0	2	3	0	4	6
„ of gape	0	1	9	0	3	9
„ from tip of muzzle to anterior edge of nostril	0	0	4	0	0	7
„ from tip of muzzle to anterior edge of orbit	0	1	3½	0	2	5
„ from tip of muzzle to ear	0	2	3½	0	4	5

Measurements, &c.—*continued.*

Measurements.	Young, figured, Specimen.			Average-size Specimen.		
	ft.	ins.	lines.	ft.	ins.	lines.
Diameter of orbit	0	0	4	0	0	5
Width of forehead between eyes	0	0	10	0	1	7
Length from tip of snout to shoulder	0	5	6	0	8	6
„ of inner toe of anterior foot	0	0	5	0	0	6
„ of claw of ditto	0	0	4½	0	0	9
„ of 2nd toe	0	0	9	0	1	1
„ of claw of ditto	0	0	5½	0	0	11
„ of 3rd toe	0	1	0	0	1	3
„ of claw of ditto	0	0	6	0	0	9
„ of 4th toe	0	1	1	0	1	6
„ of claw of ditto	0	0	5½	0	0	9
„ of 5th toe	0	0	7	0	1	1
„ of claw of ditto	0	0	5½	0	0	9
„ from shoulder to base of 3rd claw	0	2	9	0	6	0
Girth of body	0	7	0	1	3	0
Length from tip of snout to hind leg	1	6	0	1	10	0
„ of hind leg to base of 3rd claw	0	3	6	0	7	3
„ of inner toe of hind foot	0	1	0	0	1	3
„ of claw of ditto	0	0	5	0	0	8
„ of 2nd or longest toe	0	1	6½	0	2	1
„ of claw of ditto	0	0	5	0	0	9
„ of 3rd toe	0	1	1	0	1	6
„ of 4th toe	0	0	9	0	1	0
„ of outer or shortest toe	0	0	5	0	0	7
„ of claw of ditto	0	0	4½	0	0	7
„ of largest teeth, about middle of jaw	0	0	1½	0	0	2
„ of antero-posterior diameter of largest tooth	0	0	0½	0	0	1¼
„ of transverse diameter of largest tooth	0	0	0¼	0	0	0¾
Granular scales in middle of back in space of 6 lines	ten			five		

REFERENCE.— = *Lacerta varia* (Shaw), White, Journ. N.S.W., t. 3, f. 2.

This is by far the largest of the Victorian Lizards, sometimes reaching 6 feet in length, and from its fierce, bloodthirsty disposition is a most unwelcome visitor to the poultry yards, from which it occasionally carries off the chickens. Its usual food is the common Opossum, and various smaller mammals and birds. It is often popularly called *Iguana* by the settlers, but the English name originally given by Shaw is more desirable, as there is no near affinity with the herbivorous true Iguana, in which the body has a dorsal crest, a dilatable throat, a thick, wide, slightly notched tongue, imbricated body scales, and different maxillaries and dentition.

The color varies greatly, being different in every individual in the relative proportion of the yellow and the black. Our figure and description indicate the commonest marking, but in some even the usual strong, transverse, black bands on the throat are absent.

Like all of the family *Monitoridæ* or *Varanidæ*, this species has the body elongate, rounded, and without dorsal crest, carried by four strong legs, with unequal, distinctly-separated toes, each terminated by a large, powerful, arched, compressed, sharp-pointed claw; and the tail, which is usually at least twice the length of the body in the Monitors, is moderately compressed, and surmounted by two small scaly ridges. Like the other Monitors, the whole surface of the body is covered with small, oval or oblong, convex scales, each surrounded by small granules, and not imbricated. The tongue, as in the rest of the family, is slender, forked, fleshy, like that of a snake, and retractile into a pouch at its base.

Although the present Lace Lizard is generally arboreal, climbing the forest trees with ease, and running well on the ground, it can swim nearly as well as a Crocodile; and, from being thus seen in some of the Gippsland rivers, the idea has arisen that there are Crocodiles in that part of the colony. None of the family *Crocodilidæ*, however, occur in Victoria; the large claws on all the toes, and absence of webs between the toes of the hind feet, as well as the slender tongue, and absence of large, bony plates on the back, easily distinguish the Lizards of the present family from those of the *Crocodilidæ*, or true Crocodiles. In the long, slender, forked tongue, sheathed at base, as well as in the structure of several bones of the head, there is a singular approach to the *Ophidia*, or Snakes, in the Lizards of the family *Monitoridæ*, of which *Hydrosaurus varius* is the only example known in Victoria; and in the osteology the approach to the extinct fossil Saurians of the Mesozoic formations is no less striking to the European geologist.

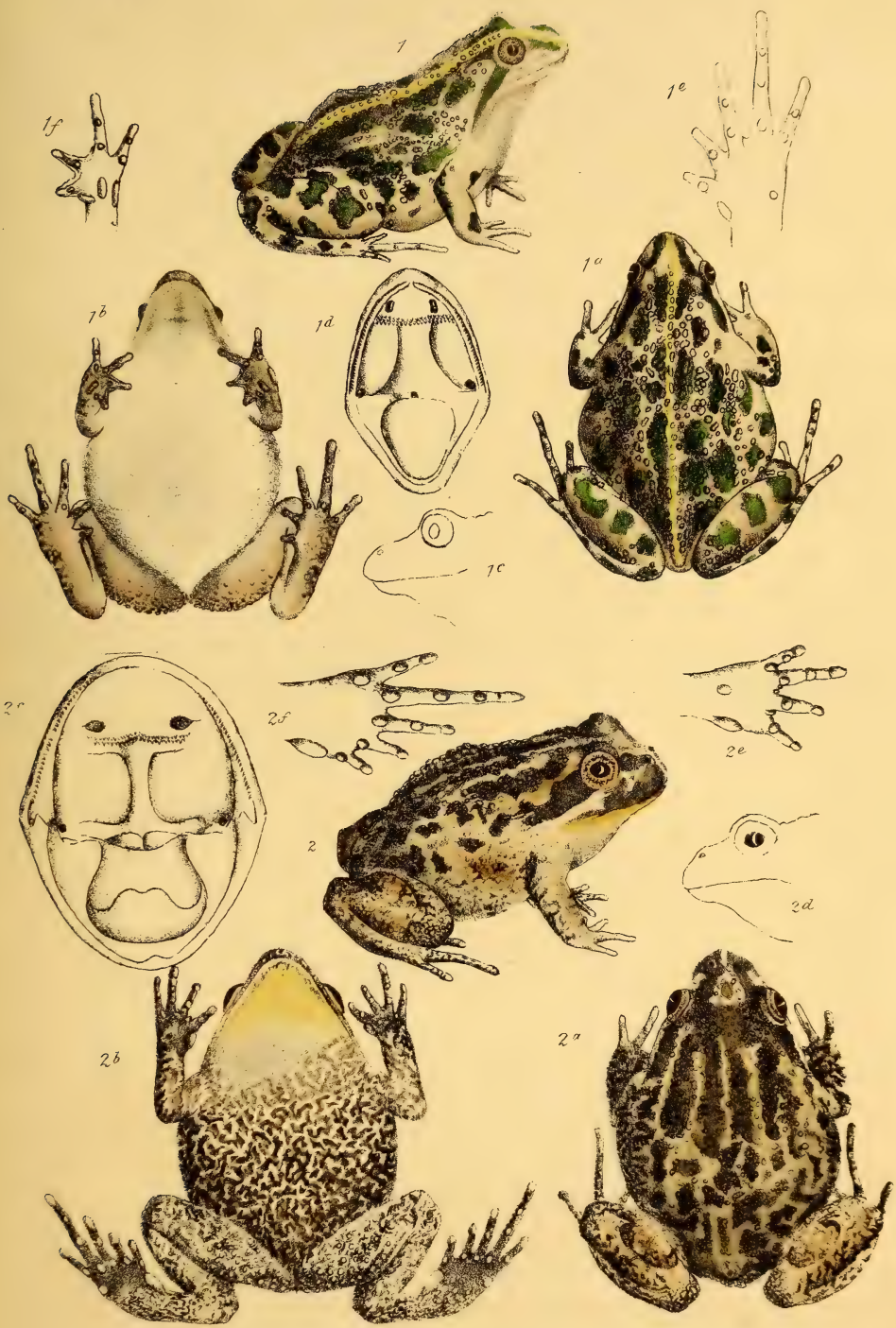
This large Lizard is very common in the warmer parts of the colony, particularly on the Murray plains. I have heard of specimens 7 or 8 feet long, but have not seen them more than 6 feet. They are very voracious, and eat living or dead animals. They are generally found in hollow trees or holes in the ground. They lay about a dozen large, tough, flexible, white eggs, about $2\frac{1}{2}$ inches long and $1\frac{1}{2}$ inches wide, the young in which are 9 or 10 inches long.

Explanation of Figures.

Plate 41.—Fig. 1, side view of young specimen, greatly reduced. Fig. 1*a*, side view of head and neck of same, small specimen, natural size. Fig. 1*b*, top view of same, to show the scales. Fig. 1*c*, anterior foot of same small specimen, natural size. Fig. 1*d*, ditto, hind foot (in both feet the perspective makes the arched claws look shorter than their correct length as given in the above measurements). Fig. 1*e*, section of tail, natural size. Fig. 1*f*, tooth, magnified, to show the serration (the outline should be slightly more curved). Fig. 1*g*, scales and surrounding granules, from side, natural size and magnified. Fig. 1*h*, scales and granules of back, natural size and magnified.

Frederick McCoy.

Pl. 42.



A. Bartholomew, del. Prof. Mc Coy, direct. F. Schoorfield, lith.

PLATE 42, FIG. 1.

LYMNODYNASTES TASMANIENSIS (GÜNTH.).

THE SPOTTED MARSH-FROG.

[Genus LYMNODYNASTES (FITZINGER). (Sub-kingd. Vertebrata. Class Reptilia. Order Batrachia. Sub-Order Anoura. Fam. Cystignathidæ.)

Gen. Char.—General form broad and short; head moderate; limbs rather short; fingers quite free; hind toes free, or very slightly webbed; skin smooth, or with scattered, depressed tubercles; with or without large gland on hind leg; tubercles under metatarsus soft, rounded, without sharp edge; palatine teeth in a nearly straight transverse band behind the inner nostrils, scarcely interrupted in the middle. Tongue rounded, very slightly notched. Openings of the inner nostrils and of the Eustachian tubes moderate. Tympanum of ear not distinctly visible externally. Males with a vocal sac under the throat. Australia.]

DESCRIPTION.—Head moderate, semi-elliptical; snout slightly produced beyond lower jaw, depressed, flat; nostrils nearer tip of snout than eyes. No large gland on calf of leg. Tongue rounded, with scarcely perceptible notch. Eyes moderate in size and prominence. Metacarpus below with 3 small elongate tubercles (that of the thumb or inner side largest); metatarsus below with 2 very small rounded, soft tubercles; tympanum slightly visible; surface of back nearly smooth, with scattered, small, slightly prominent, rounded tubercles; two inner fingers with membranous border in adult female; toes very slightly webbed at base, slightly bordered. *Color:* ground color of upper surface varying from light stone-grey to nearly black, with 3 or 4 rows on each side of elongate, rounded, or oblong patches or spots with jagged edges of sap-green (becoming brown in spirit), each leg with 3 or 4 transverse patches of similar shape and color, and smaller spots on arm and feet; a longer streak of the same color from the snout through the nostril to the eye, and thence tapering to the point of the shoulder; underside of throat, body, and legs pearly-white; usually a narrow light stripe along middle of back from tip of snout to posterior end, but often indistinct. A whitish glandular ridge from eye to end of green band near shoulder behind the angle of mouth. Iris golden bronze.

REFERENCE.—Cat. Brit. Mus. Batrac. Sal., p. 33, t. 11, fig. B.

This beautiful little species is not uncommon in marshy places and shallow waters about Melbourne, where it forms a favorite food of snakes. At the end of November the young, about 1 inch long, takes to the land, having its four limbs perfect, but with a tail of half an inch long remaining. The diapophyses of the last sacral vertebræ are only slightly widened at their distal ends.

The color of the spots is erroneously said by Dr. Steindachner (Reise der Österreichischen Fregatte Novara) to be brown, speci-

mens in spirit taking this hue. It has not been figured of its natural colors before.

EXPLANATION OF FIGURES.

PLATE 42.—Fig. 1, side view, one-fourth larger than nature. Fig. 1*a*, back view of ditto. Fig. 1*b*, underside of ditto. Fig. 1*c*, profile of ditto. Fig. 1*d*, mouth, showing openings of the two nostrils and two Eustachian tubes, and the transverse band of palatine teeth, with the heart-shaped tongue with an almost imperceptible notch on hinder edge, enlarged. Fig. 1*e*, underside of hind foot, enlarged. Fig. 1*f*, underside of anterior foot, enlarged.

PLATE 42, FIG. 2.

LYMNODYNASTES DORSALIS (GRAY).

THE COMMON SAND-FROG.

DESCRIPTION.—Head rather large, broad, semi-elliptical; snout thick, only moderately elongate, bluntly rounded; eyes moderately large; a large, oval, swollen gland on the calf of each leg; tongue rounded, very slightly notched behind; straight transverse band of palatine teeth, interrupted in the middle; metacarpus with a large, soft, oval, white tubercle on inner edge, and a much smaller, rounded one in the middle of underside; underside of metatarsus with only one large, oval, soft, white tubercle on inner edge, and none in the middle; skin with numerous very small tubercles. *Color:* above dull yellowish-grey, with large very irregular longitudinal patches, with jagged edges, of dark-grey or blackish; a more or less distinct, narrow, straight, light stripe along middle of back from tip of snout to posterior end (sometimes nearly obliterated by the encroaching irregularities of the dark blotches); legs and sides irregularly mottled with much smaller, vermicular, dark markings; underside of legs and belly marbled with small, close, vermicular markings of liver-color or chocolate on whitish ground; throat dull, yellow-ochre with or without the markings of the belly; a dark band from tip of snout to eye, and a dark and broader one with a yellow under-edge from eye to shoulder. Iris golden bronze; nostrils midway between eye and tip of snout.

REFERENCE. = *Cystignathus dorsalis* (Gray) in Eyre's Central Australia, t. 1, f. 2; Günth. Cat. B. M. Batrac. Sal., p. 33.

This curious Frog is easily distinguished from the *L. Tasmaniensis* by the large, swollen, oval gland on the calf of each leg, as well as by the darker coloring of the back and the dark chocolate marbling of the underside, the broader and thicker head, and the smaller number of tubercles on the underside of the ankle and wrist joints;

the palatine bands of teeth are more divided in the middle, and the notch of the tongue is slightly larger. The diapophyses of the last sacral vertebræ are only slightly dilated.

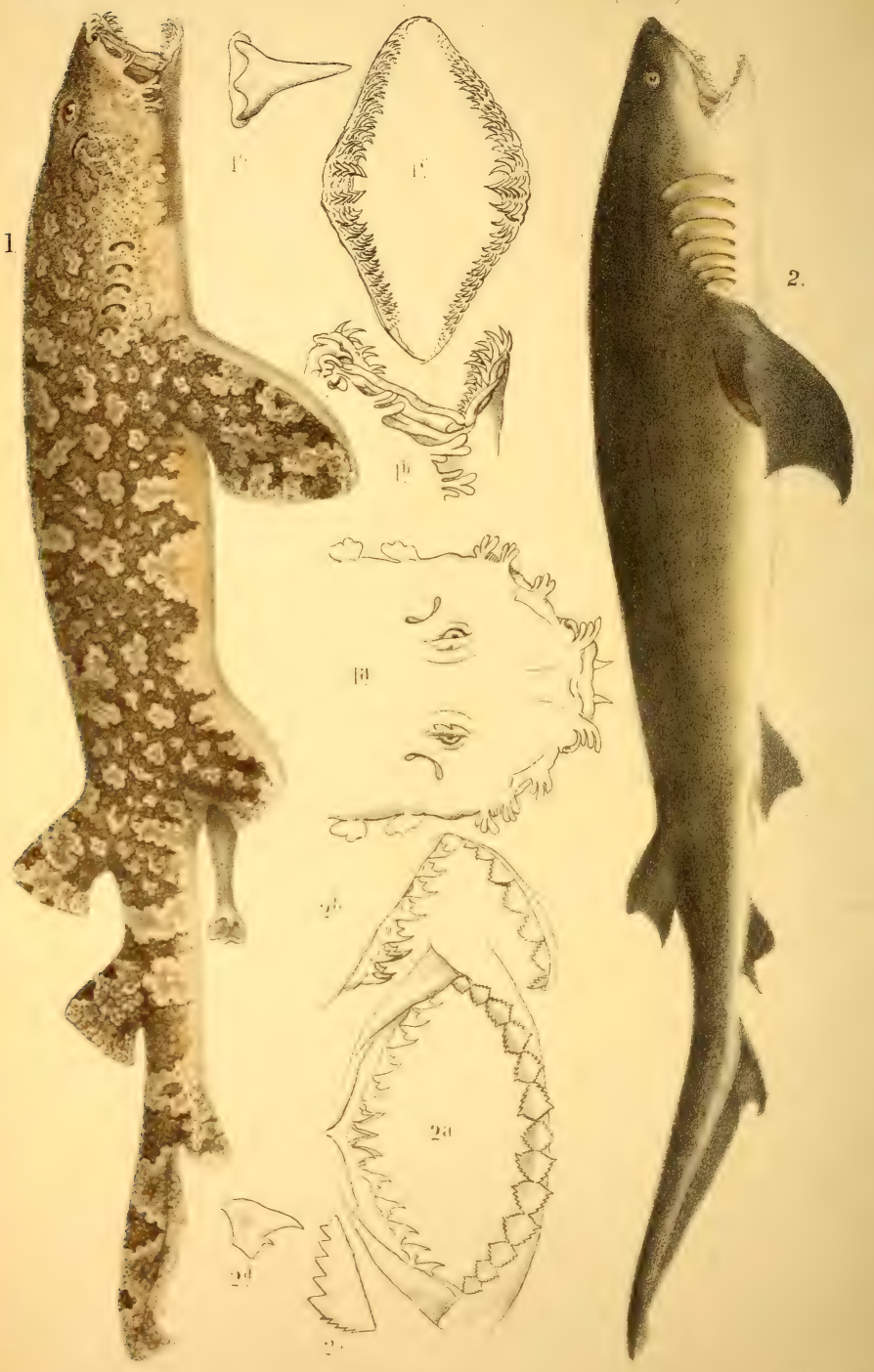
Some of the large specimens agree more exactly in markings with Gray's figure than ours, which latter shows an extreme of darker and closer marking and no distinct dorsal stripe ; there are, however, all varieties between these extremes.

The oddest characteristic of this species is its habitually burying itself seven or eight inches under the surface of the light sandy soil of Brighton and other similar localities on the south coast, where it may be dug out any day in considerable numbers ; only coming out by night to feed on the large nocturnal spiders which abound on the surface at the same time. These localities, in which the Sand-Frog most abounds, are entirely waterless, and the habit of burying itself in the sandy ground by day keeps it from the scorching rays of the sun, while the habit of coming to the surface and running over the ground by night introduces it to the snakes, which in such arid plains one would expect to have little chance of meeting batrachian food, of which it is evident they are very fond, from the abundance of the remains found on opening them. A similar habit of covering itself by day in light soil, it will be remembered, Mr. Darwin observed in some of the South American Frogs ; although my first statement of its being observable in Australia in this species has been contradicted by a writer in Sydney, who does not seem to have met the creature, which may be turned up with the spade, however, in any of the gardens of the locality I mentioned. It has not been figured of the natural colors before.

Explanation of Figures.

Plate 42.—Fig. 2, profile view, natural size. Fig. 2*a*, upper view, natural size. Fig. 2*b*, under view, natural size. Fig. 2*c*, mouth, twice the natural size, showing the maxillary and palatine bands of teeth, the openings of the nostrils and Eustachian tubes, and the tongue, the notch of which is a little exaggerated by being drawn forward. Fig. 2*d*, profile, to show thick muzzle with little projection of upper jaw, and central position of nostrils. Fig. 2*e*, underside of anterior foot, once and a half larger than nature, to show the tubercles. Fig. 2*f*, underside of hind foot, once and a half larger than natural size.

Frederick McCoy.



F. Schönfeld lith. Prof. M.ᶜ Coy direxᵗ Hamel & Cᵒ imp.

PLATE 43, FIG. 1.

CROSSORHINUS BARBATUS (LIN. SP.).

THE CARPET SHARK.

[Genus CROSSORHINUS (MÜLL. and HENLE). (Sub-kingd. Vertebrata. Class Pisces. Order Plagiostomata. Section Selachoidei. Fam. Scylliidæ.)

Gen. Char.—Two dorsal fins, without spines, the 1st just behind the ventral, the 2nd in front of the anal, which is close to the caudal. Tail small. Head broadly rounded with numerous, flat, skinny appendages on the sides. Eyes very small. Spiracles extremely large, lunate, nearly equalling the gill-openings, a little behind and below the eye. Nasal and buccal cavities confluent; a free nasal cirrus. Mouth opening nearly at the anterior edge of the head, upper and lower lips well developed. *Teeth* nearly similar throughout in both jaws; of a central cusp, sub-compressed, conical, narrow, pointed; base moderate, without cusps, but with a small median lobe pointing to the base. Gill-openings very small, the 4th and 5th rather smaller and closer than the others, and situated behind the anterior edge of the pectoral fin. Japan and Australasia.]

DESCRIPTION.—Broadly ovate, body slightly depressed as far as the dorsal, slightly compressed as far as the tail. Tail rather abruptly narrowed, small. Two large, three-branched nasal cirri, one at inner base of each nostril, behind which, along a line to a little beyond corner of mouth, are 5 flat, more or less lobed, skinny appendages; a 6th, much larger, wider, flatter, bifid or trifid one halfway to the anterior gill-opening; and a 7th, slightly smaller, halfway between the 6th and the gill-opening. A prominent ridge over and behind each eye, having 2 small lobes on the anterior end over the eye. Distance between the dorsals about equal to the length of the base of the anterior one. *Color:* ground-color of entire body a brownish ashy grey; plain on the whole of the under surface, but thickly spotted with two shades of rich brown on the top and sides of the head, the lighter of these brown tints enlarging from behind the eyes to the extremity of the tail on the whole of the upper surface of the body and fins into large, irregular patches, leaving jagged, irregular, unequal cloudings of the greyish ground color, with small spots of the darker brown irregularly scattered round the edges of the light patches; the largest of these light-grey mottled spaces with dark-brown spotted edges are disposed in conspicuous transverse patches on the tail.

REFERENCE.=*Squalus barbatus* (Lin.), S. N., p. 1493; =*S. lobatus*, Bl. & Schn., p. 137; =*S. appendiculatus* (Shaw), Nat. Misc., t. 727; =*Crossorhinus barbatus* (Müll. and Henle), Syst. Besch. Plagiostomen, p. 21, t. 5.

The following are the measurements of the male figured specimen :—

Measurements.	ft.	ins.	lines.
Length from tip of snout to distal end of caudal	7	10	0
„ „ „ anterior edge of anterior dorsal ...	4	1	6
„ „ „ anterior edge of second dorsal ...	5	2	6
„ „ „ anterior edge of pectoral ...	1	10	6
„ „ „ anterior edge of ventral	3	9	0
„ „ „ anterior edge of anal	6	1	0
„ of anterior edge of pectoral	1	2	0
„ of posterior margin of pectoral	1	0	6
„ of anterior edge of ventral	0	8	0

Measurements—*continued.*

Measurements.	ft.	ins.	lines.
Length of posterior margin of ventral	0	8	0
„ of claspers of male	0	8	0
„ of base of 1st dorsal	0	6	0
„ of anterior margin of 1st dorsal	0	7	0
„ of base of 2nd dorsal	0	6	6
„ of anterior margin of 2nd dorsal	0	6	0
„ of base of anal	0	3	6
„ of anterior margin of anal	0	3	0
Greatest depth of middle of caudal fin	0	1	6
Length of anterior edge of posterior terminal portion of caudal beyond notch	0	3	0
Length from tip of snout to anterior margin of eye	0	7	4
Diameter of eye	0	0	9
Distance between eyes	0	5	6
„ from posterior edge of orbit to middle of spiracle ...	0	1	9
Length of spiracle	0	2	9
„ from anterior gill-opening to tip of snout	1	4	6
„ of largest anterior gill-opening	0	2	6
Girth in front of pectoral	3	5	0

This most beautiful Shark is not very uncommon in Hobson's Bay, three fine specimens being in the Museum collection. The coloring varies in size and shape of the cloudings and spottings a little ; and the number of lobes into which the skinny appendages of the sides of the head and neck are divided is so irregular that the two sides are often dissimilar in one individual.

Explanation of Figures.

Plate 43.—Fig. 1, side view of average male specimen, showing the claspers beyond the ventral fins, reduced. Fig. 1*a*, head of ditto, viewed from above, to show the form and disposition of the appendages and spiracles. Fig. 1*b*, side view of mouth. Fig. 1*c*, front view of mouth, showing the number of rows of teeth in use. Fig. 1*d*, one of the teeth, natural size, showing the median lobe of the base.

Plate 43, Fig. 2.

NOTIDANUS (HEPTANCHUS) INDICUS (Cuv.).

The Seven-Gilled Shark.

[Genus NOTIDANUS (Cuv.). (Sub-kingd. Vertebrata. Class Pisces. Order Plagiostomata. Section Selachoidei. Fam. Notidanidæ).

Gen. Char.—Only one dorsal fin, nearly opposite the anal ; no pit at the root of the caudal fin ; no nictitating membrane ; spiracles very small ; no labial fold ; mouth moderate ; gill-openings very large ; 6 (sub-genus *Hexanchus*), or 7 (sub-genus *Heptanchus*), teeth in the upper jaw, composed of usually 2 or 3 simple, narrow, pointed teeth in front, without cusps at base, behind which on each side are about 6 broad, obliquely-triangular, flattened teeth, usually the

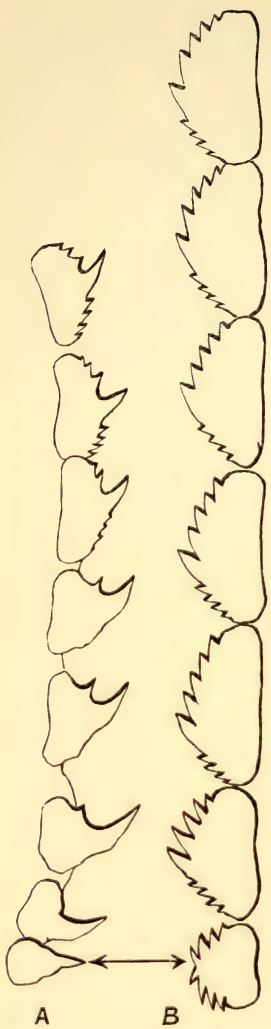
anterior cusp of each of which is much the largest, with a variable number of much smaller cusps on the posterior edge; all the teeth of lower jaw broad, flattened, triangular, divided into numerous cusps, decreasing from the front to the hinder cusp, with the anterior edge usually serrated.]

DESCRIPTION.—Snout semi-elliptical, length rather less than half the distance between the anterior edge of orbits. Shape, elongate fusiform; the hinder edge of the dorsal fin extends slightly farther back than the vertical of the anterior edge of the anal fin. Caudal fin triangular at the tip, with a small notch at posterior end of narrow lower margin; anterior lobe moderate, triangular. *Color:* all the upper surface and fins of a greyish-ash color, the sides with a few small, whitish, round spots; belly whitish. *Teeth:* upper jaw, one small, narrow, pointed tooth in middle, and one larger, narrow, simple, slightly oblique on each side, behind which are 6 large, flat, obliquely-triangular teeth, the anterior cusp of each of which is very much larger than the others; the 1st tooth has 1 small, lateral, posterior cusp, the 2nd and 3rd have 2, the 4th and 5th have 3 or 4, gradually diminishing, small cusps on the posterior edge, the two hindmost teeth having 3 or 4 serratures on the base of the anterior margin, the anterior ones only 1 or 2. Lower jaw, with all the teeth large, flat, obliquely-subtrigonal, except the middle one, which, although broad and flat, is bifid, having 2 oblique, divaricating, principal cusps in the middle, with 3 or 4 gradually decreasing cusps on each side; the other teeth have the 1st cusp largest, with 3 or 4 gradually-decreasing to the posterior end, the anterior margin of each tooth serrated, with 3 or 4 small spines on the base.

REFERENCE.—*Notidanus Indicus* (Cuv.), Reg. Anim.; = *Heptanchus Indicus*, Müll. and Henle, System. Besch. Plagiostom., p. 82, t. 32.

The following are the dimensions of the specimen figured:—

Measurements.	ft.	ins.	lines.
Length from tip of snout to distal end of caudal	8	1	0
„ „ „ anterior edge of orbit ...	0	5	3
„ „ „ anterior edge of pectoral ...	1	7	0
„ „ „ origin of dorsal	4	6	0
„ „ „ origin of ventral	3	10	0
„ „ „ origin of anal	5	1	6
„ from anterior edge of lower lobe of caudal fin to extremity of same lobe	0	8	6
„ from anterior edge of lower lobe of caudal fin to tip of tail	2	3	6
Girth in front of pectoral	3	1	0
Length from tip of snout to nostril	0	1	9
Vertical length of anterior gill-opening	0	8	0
„ length of posterior gill-opening	0	3	6
Antero-posterior length of the 7 gill-openings	0	6	6
Length from tip of snout to central tooth	0	4	0
„ of base of pectoral	0	7	3
„ of anterior edge of pectoral	0	10	6
„ of base of dorsal	0	8	3
„ of anterior edge of dorsal	0	6	3
„ of base of anal...	0	5	3
„ anterior edge of anal	0	4	3
„ middle tooth of upper jaw	0	0	3
Width at base	0	0	2
Length of 2nd sublunate tooth	0	0	5
Width at base...	0	0	3
Antero-posterior length of base of 3rd tooth	0	0	6
Height of principal cusp	0	0	7
Width of middle lower tooth	0	0	5
Height of middle lower tooth	0	0	4
Antero-posterior length of base of 2nd tooth	0	0	8
Height of principal cusp	0	0	5
Width between the orbits	0	7	0



A, middle tooth and teeth of one side of upper jaw.
B, middle tooth and teeth of one side of lower jaw, natural size.

The Sharks of this genus are easily distinguished from all others by having only one dorsal fin, and the peculiar conformation of the teeth, as well as the great size and number of the gill-openings. The present species belongs to the sub-genus *Heptanchus*, in which these reach the extraordinary number of 7, and it is distinguished from the other species of the sub-genus by having a single or odd, not oblique, central subulate tooth in each row in the middle of the upper jaw. As the peculiarities of the teeth are not quite distinct in the reduced figures on the plate, I give a view in the adjoining woodcut of the teeth of both jaws, natural size.

This is one of the rarer Sharks found in Hobson's Bay, from which locality there are three specimens in the Melbourne National Museum, the one above described being the largest of the three, and a female. A smaller male is in the collection, with moderate claspers.

EXPLANATION OF FIGURES.

PLATE 43.—Fig. 2, side view of female, reduced. Fig. 2*a*, front view of mouth, showing the dissimilarity of the upper and lower rows of teeth (the bifid apex of the centre lower tooth not sufficiently clear). Fig. 2*b*, side view of mouth. Fig. 2*c*, first broad lateral tooth of lower jaw, natural size. Fig. 2*d*, first lateral tooth of upper jaw, natural size.

FREDERICK McCOY.

1b.
1a.
2.
1.
2c.
2b.
2a.
1d.
1c.

PLATE 44, FIG. 1.

THERSITES ATUN (CUV.).

THE BARRACOUTA.

[Genus THERSITES (CUV. and VAL.). (Sub-kingd. Vertebrata. Class Pisces. Sub-class Teleostea. Order Acanthopterygia. Fam. Scomberidæ.)

Gen. Char.—Body long, slender; mouth deeply cleft; dorsals continuous; spines of moderate size; 2 to 6 finlets behind the dorsal and anal fins; greater part of body naked; no corset; no keel on tail; 7 branchiostegals; pyloric appendages moderate; an air-bladder. Teeth on the edges of the jaws of moderate size, conical, compressed, pointed, but a few very large on the intermaxillary bones.]

DESCRIPTION.—Body a little deeper than twice the height of dorsal fin, and rather more than one-eighth of total length, thickness about two-thirds of depth; head compressed, pointed, flat above, with straight profile and vertical sides, twice and one-eighth longer than high; lower jaw longer than upper one; length of head about four and a half in total length; mouth slit so that the slightly dilated end of the maxillary reaches to under anterior edge of orbit; eye about midway between tip of snout and edge of gill-cover, and near the upper edge of cheek. Lateral line with anterior part straight and near the dorsal until opposite 15th ray, then descending abruptly to near middle and continuing to tail with several large undulations. *Fins:* 1st dorsal, rays, 20; 2nd dorsal, 1 spinous and 10 soft; anal, 1 spinous and 10 soft; ventral, 1 spinous and 5 soft; 6 finlets above and below. *Teeth:* about 26 to 30 subequal, sharp, conical teeth on each side of upper jaw, the anterior smaller and not quite reaching the tip of the snout; with a row of fewer and larger ones in lower jaw; a median group of 4 or 5 large, strong, recurved, pointed teeth, six or eight times longer than the others, in the middle of the upper jaw, within the dentary edges; a row of about 7 very small equal teeth on each palate-bone. *Color:* back and top of head purplish-black; color and lustre of cheeks and rest of body and belly uniformly like polished lead; upper part of gill-cover darker; iris, pale golden-yellow; anterior dorsal fin with the rays whitish-yellow, the basal and anterior part of each membranous portion transparent and colorless, the posterior and upper portion blackish; posterior dorsal and finlets dirty-yellowish; pectoral and caudal fins dirty-brown, the middle of the caudal silvery; anal and ventral dirty-whitish.

The detailed measurements are as under:—

Measurements.	(A)	(B)	Approximate Proportional Measurements. (A)	(B)
	ft. ins. lines.	ins. lines.		
Length from snout* to distal end of middle of caudal ...	3 5 3	10 0	100	100
„ of caudal to middle	0 1 1	0 6	3	5
„ of caudal to end of lobes	0 5 0	1 5	12	14
„ from snout to anterior edge of orbit	0 3 9	1 0	9	5
„ of orbit	0 1 1	0 6	3	5
„ of head from snout to end of operculum	0 8 7	2 5	21	24

* The snout measurements are from the tip of upper jaw and not from the longer lower jaw.

Measurements—*continued.*

Measurements.	(A)	(B)	Approximate Proportional Measurement. (A)	(B)
	ft. ins. lines.	ins. lines.		
Length from snout to anus (measured along ventral edge)	2 4 0	6 7	67	66
„ from anus to end of middle of caudal	1 1 3	3 5	32	34
„ from snout to base of pectoral	0 8 6	2 6	21	25
„ from snout to origin of 1st dorsal	0 8 0	2 3	20	22
„ from snout to origin of 2nd dorsal	2 5 0	7 0	69	70
„ from snout to origin of ventral fin	0 8 9	2 9	22	28
„ of pectoral	0 3 3	0 11	8	9
Height of 1st dorsal	0 2 1	0 9	5	8
„ of 2nd dorsal	0 2 6	0 8½	6	8
Length of anal	0 2 9	0 11	7	9
Depth of anal	0 2 3	0 8	6	7
Length from base to tip of ventral fin	0 1 5	0 5	3	5
Width between eyes	0 1 7	0 5	4	5
Depth of body in front of ventral, about	0 5 0	1 5	12	14
Thickness of body in front of dorsal, about	0 4 0	0 9	10	8
Length of largest intermaxillary teeth	0 0 6	0 3	...	...
„ of largest teeth of upper jaw	0 0 1½	0 0½	...	...
„ of largest teeth on edge of lower jaw	0 0 2½	0 1	...	...

Reference.—Cuv. & Val., Hist. Nat. des Poissons, vol. 8, t. 219.

There can be no doubt of the identity of our Australian Barracouta and that so abundant at the Cape of Good Hope; and Dr. Richardson's supposed *T. altivelis* must, I fancy, be founded on some mistake. The stomach usually contains many small fishes of its own and other species.

The Barracouta is a tolerably good fish for the table, and is abundant in the waters round the coast in all the colder months of the year.

Explanation of Figures.

Plate 44.—Fig. 1, side view of moderate specimen, one-fifth of the natural size. Fig. 1*a*, inside of mouth, showing 2 rows of small palatine teeth, the row of larger teeth on edge of upper jaw not quite reaching the tip, and the small group of very large teeth in front. Fig. 1*b*, teeth of lower jaw, and tongue.

(N.B.—Figs. 1*c* and 1*d* are scales of the corslet, natural size and magnified, of the Tunny.)

PLATE 44, FIG. 2.

THYNNUS THYNNUS (LIN. SP.).

THE TUNNY.

[Genus THYNNUS (CUV.). Sub-kingd. Vertebrata. Class Pisces. Sub-Class Teleostea. Order Acanthopterygia. Fam. Scomberidæ).

Gen. Char.—Body thick, fusiform, tapering each way from about pectoral; 1st dorsal fin moderate, of rather small spines, reaching nearly or quite to 2nd dorsal; 6 to 9 finlets behind the dorsal and anal fins. Scales of the pectoral region larger than the others, forming a corslet. Jaws moderate with small teeth, and still smaller on the vomer and palatine bones. A longitudinal keel on middle of each side of the tail. Air-bladder simple or absent. Pyloric appendages numerous. Branchiostegal rays, 7. Open sea of tropical and temperate regions.]

DESCRIPTION.—*Fin-rays:* 1st dorsal of 13 to 15 spines, 1st longest; 2nd dorsal of 13 to 15 spines; 8 or 9 pinnulæ above and below; anal, 12 to 14; ventral, 6 to 7; pectoral, 30 to 34; caudal, about 18 rays above and below, with about 9 or 10 smaller ones in the middle. *Form:* Height of body and length of head almost equal, and less than $3\frac{1}{2}$ in total length to middle of posterior edge of caudal fin; pectoral reaching to vertical from 11th dorsal spine; body thick, fusiform, broad, ovate; greatest depth of body and length of head nearly equal; lower jaw slightly longer than the upper. *Teeth:* 30 to 36 teeth on edge of lower jaw, those on upper jaw smaller and more numerous; a band of 4 rows of very minute teeth on the palatine bone of each side; midline of vomer with still more minute teeth in many rows, forming a small, dilated, triangular patch in front. *Scales:* The large scales forming the corslet are not very distinctly distinguishable until the skin is dry; they occupy a space, the posterior boundary of which varies, but generally extending in a narrow strip backward along base of the dorsal fins, descending about opposite the middle of 1st dorsal, and then running back at an acute angle as far as the end of the 2nd dorsal, thence forward to below base of pectoral, which can be sunk in a depression fitting it. The scales of lateral line distinct from middle angle of corslet to ridge on side of tail, of larger and stronger scales than the body behind the corslet, each rotundato-quadrate, and with a prominent tubular keel; the line is slightly flexuous. Preoperculum with irregular longitudinal short grooves. *Color:* uniform purplish-black, with steel-blue reflections above; with brownish tinges on the top and sides of the head; belly and lower part of the sides silvery-white; fins dark brownish-purple, except the pectoral, which is black; finlets rich chrome-yellow, with a narrow, blackish margin; tongue and mouth black; iris golden-yellow on the outer margin, greenish and silvery towards inner edge.

REFERENCE. = *Scomber thynnus.* Lin., Syst. Nat., p. 493; = *Thynnus vulgaris,* Cuv. and Val., Hist. Pois., vol. 8, t. 210. Couch, Fish Brit. Is., vol. 2, p. 86, t. 82; = *T. Maccoyi* (Cast.), Proc. Zool. & Ac. Soc. Vict., v. 1, p. 104.

The following are the measurements of 5 specimens in the National Museum from the Victorian coasts, varying from 5 feet 10 inches to 18¼ inches in length :—

Measurements.	A.	B.	C.	D.	E.
	ft. ins. lines	ins. lines	ins. lines	ins. lines	ins. lines
Length from tip of snout to distal end of middle of caudal	5 10 0	33 9	32 9	25 6	18 3
„ from tip to tip of caudal	1 9 0	9 9	7 6	5 6	6 3
„ of lobes of caudal	1 2 0	6 6	6 3	4 9	3 6
„ of middle of caudal	0 3 0	1 3	1 3	0 11	0 7
„ from snout to anterior edge of orbit	0 7 0	3 6	3 6	2 9	1 11
„ of eye	0 2 3	1 6	1 6	1 3	0 11
„ of head to end of operculum	1 7 6	10 3	9 6	7 4	5 4
„ from snout to front of anal fin (measured along ventral edge)	3 6 0	20 6	20 6	16 9	11 6
„ from snout to base of pectoral	1 8 0	10 6	9 6	7 9	5 5
„ from snout to origin of 1st dorsal	1 9 0	11 0	11 6	8 3	6 1
„ from origin of 1st dorsal to origin of 2nd dorsal	1 3 0	8 6	7 6	6 0	4 6
„ from origin of 2nd dorsal to outer origin of caudal	2 3 0	13 0	12 9	9 0	7 5
„ of pectoral	0 11 0	6 3	6 6	4 9	3 3
„ of 1st dorsal	1 3 0	7 6	7 5	5 7	4 3
„ of 2nd dorsal	0 5 6	3 3	3 4	2 1	2 0
Space between dorsals	0 0 9	0 6	0 2	0 3	0 3
Length of anal	0 4 0	2 6	2 0	1 2	1 1
„ of ventral	0 2 3	1 5	1 0	0 7	0 9
„ from snout to base of ventral	1 9 0	10 9	10 3	8 6	6 3
Depth of body in front of dorsal	1 4 0	10 0	8 0?	6 0?	5 4?
Thickness of body in front of dorsal	1 1 6	8 0	5 6?	4 9?	4 0?
Height of 1st dorsal	0 7 0	3 6	2 9	2 6	2 0
„ of 2nd dorsal at highest anterior end	0 8 0	3 6	4 0	2 5	1 7
Depth of anal	0 8 0	3 6	3 6	2 1?	1 6
„ of ventral	0 6 9	3 3	3 3	2 6?	1 6?
Fin rays—					
1st dorsal	14	13	15	14	15
2nd dorsal	15?	15?	14?	13?	13?
Pinnules above	9	8	9	8	8
„ below	9	8	9	8	8
Pectoral	30?	34	32	32	32
Ventrals	6	7	6	6	6
Anal	12?	14?	12?	13?	13?
Caudal (20 from tip to tip, 9 or more shorter, above and below, outside)	58?	40?	$20\frac{9}{9}$	$20\frac{15}{15}$	$20\frac{15}{15}$

To give a clearer idea of the proportions indicated by the above measurements, they are approximately reduced in the following table to fractions of the total length, taking that in each case as 100. The near identity in most respects, and the comparatively smaller size of the eye and head in the largest specimen, will strike the attention at once in this way ; the latter being a general characteristic difference between old and young individuals to which I have often drawn attention in other fishes, where a neglect

of this generalization had erroneously suggested differences in species which were only due to age. This can be noted as varying thus from the smallest (the figured) specimen, marked E, to the largest, marked A. Also, I think, the depth of a fish varies so much by the different conditions of the abdomen from food, ova, &c., as to be an untrustworthy character. On similarly reducing the proportion of Cuvier's and Couch's original figures from fresh specimens, they are found to agree closely in most particulars of importance.

Proportional Size of parts in fractions of total length, taken as 100.	Proportions of Cuvier's Fig., Reg. Anim.	A.	B.	C.	D.	E.
Length from tip of snout to distal end of middle of caudal (as above)						
„ from tip to tip of caudal	30	30	29	23	22	35
„ of lobes of caudal	26	20	19	19	19	19
„ of middle of caudal	4	4	4	4	4	4
„ from snout to anterior edge of orbit ...	10	10	11	11	11	11
„ of eye	5	3	5	5	5	5
„ of head to end of operculum	27	27	30	29	29	29
„ from snout to front of anal fin (measured along ventral edge)	60	60	60	63	66	63
„ from snout to base of pectoral	28	28	31	29	30	29
„ from snout to origin of 1st dorsal ...	32	30	33	35	32	33
„ from origin of 1st dorsal to origin of 2nd dorsal	24	22	25	24	23	25
„ from origin of 2nd dorsal to outer origin of caudal	38	38	38	39	35	40
„ of pectoral	20	16	19	20	19	18
„ of 1st dorsal	23	22	22	22	22	23
„ of 2nd dorsal	9	...	...	...	...	...
Space between dorsals	...	1	1	1	1	2
Length of anal	7	6	7	6	5	6
„ of ventral	3	4	5	4	3	4
„ from snout to base of ventral	29	30	32	32	33	34
Depth of body in front of dorsal	26	23	30	25?	24?	29?
Thickness of body in front of dorsal	...	14	24	17?	19?	22?
Height of 1st dorsal	14	10	10	9	10	11
„ of 2nd dorsal at highest anterior end ...	16	12	10	12	10	9
Depth of anal	16	12	10	11	8?	8
„ of ventral	15	8	10	10	10?	8?

The sides and belly in our specimens are uniform silvery and pearly white, without the mottling or spotting mentioned by Cuvier; and in this respect they agree with the descriptions taken from the life by Storer and Couch of American and English examples noted by them.

There is a small longitudinal keel on the tail above, and one below the larger keel, which smaller ones are only visible when

dry, and, as Couch observes, the second dorsal and anal fins are so thick when alive that it is very difficult to count the rays satisfactorily.

In different descriptions of this fish, the iris is said by some to be silvery, by others golden, and by others green ; the fact was seen to be, in our largest specimen (the eye of which was represented in a careful colored drawing while fresh), that the outer portion of the iris was rich, golden, brownish-yellow, the middle portion greenish, and the inner edge silvery.

I cannot doubt, after careful investigation, that the common Victorian Tunny (called Bonito erroneously by the colonists and fishermen), to which Count Castelnau assigned the name *Thynnus McCoyi*, as a new species, is really the common Tunny of European and American writers. By a slight error in the lithographing of our figure, the body seems to project at base of anal and 2nd dorsal fins, but, as above described, the fusiform outline is deepest under the 1st or 2nd spine of 1st dorsal, tapering thence gradually and regularly to the tail, and more rapidly to the snout. In stuffed or dried specimens of this, as in many other fishes, the under jaw seems considerably longer than the upper, with which it more nearly agrees in length when alive ; this arises from the shrinking of the soft portions between the several bones of the anterior part of snout above, while the more solid lower jaw retains its proper length more exactly.

The θύννος of Aristotle, and *Thynnus* of Pliny, ranging from the Mediterranean over the warm parts of the Atlantic, Pacific, and Indian Oceans, only rarely visits Victoria ; our specimens having all been obtained in the winter months of July or August. The largest specimen, from Portland, was presented by Mr. Goldstein, so well known for his microscopic researches on Polyzoa and other marine objects. On account perhaps of the beef-like redness of the flesh, it is not prized as food, and the fishermen here, as at home, note the greater heat of the body than in other fish, due to this condition of the muscles from the abundance of oxygenated blood.

It reaches 10 or even 20 feet in length in Europe and America, but our individuals are rarely more than 4 feet long, and must be

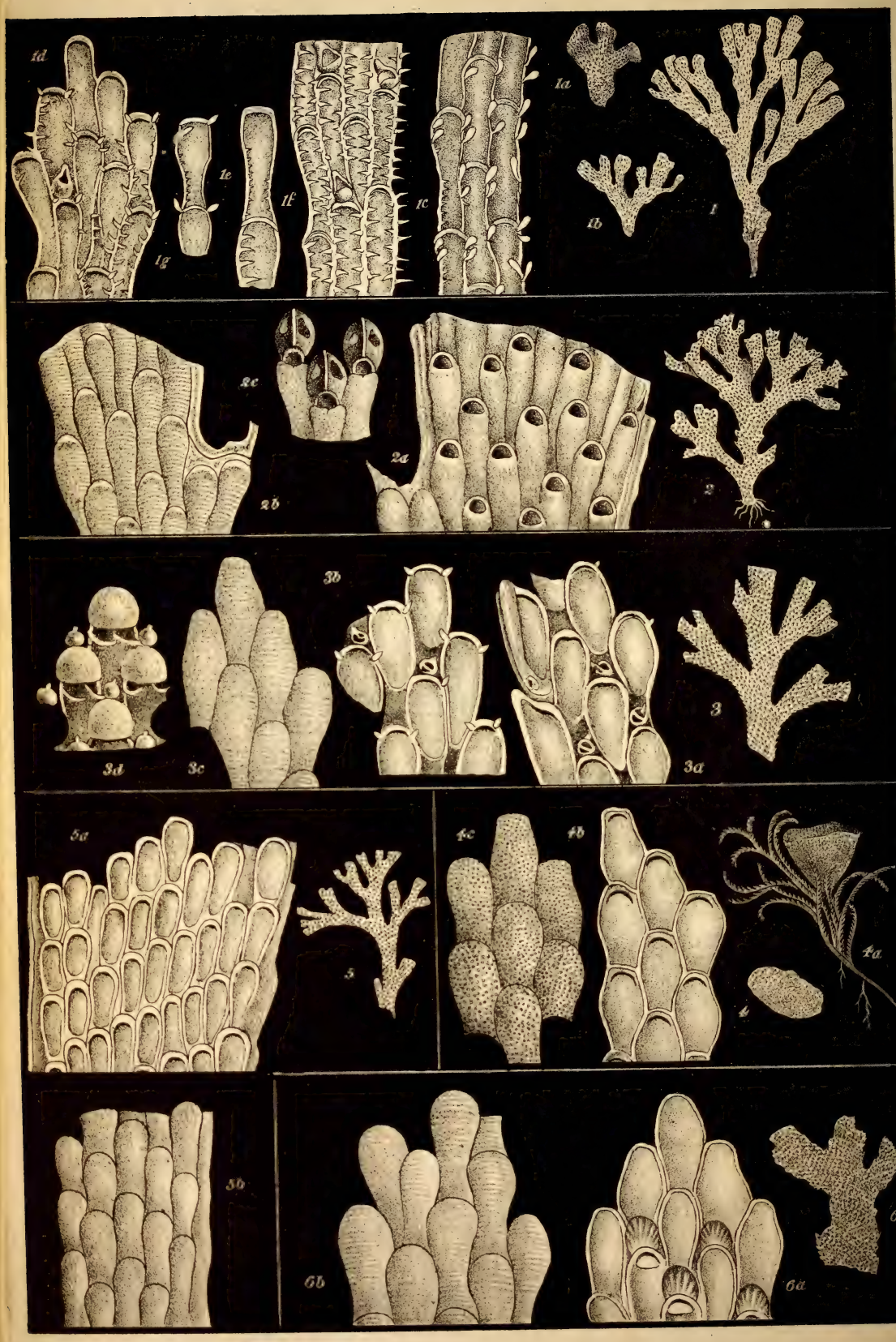
all young ; Belon's statement of one reaching 32 feet in length has not been parallelled in modern times, and is perhaps erroneous.

Of the above 5 specimens, the smallest, or figured one, was caught in Hobson's Bay, the largest at Portland, the next in size in Bass' Straits, the next at Queenscliff.

Explanation of Figures.

Plate 44.—Fig. 2, side view of small specimen, one-third the natural size (a little too protuberant at base of anal and 2nd dorsal fins). Figs. 2*a*, 2*b*, 2*c*, scales, natural size and magnified. Figs. 1*c* and 1*d*, scales of corslet, natural size and magnified.

Frederick McCoy.



J. Ripper del.
A. Bartholomew lith.

Prof. McCoy direx.

C. Troedel & Co imp.

PLATE 45, FIG. 1.

FLUSTRA DENTICULATA (BUSK).

[Genus FLUSTRA (LINN.). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-Order Cheilostomata. Fam. Flustridæ.)
Gen. Char.— Cells contiguous, on both sides of the polyzoary.]

DESCRIPTION.—Cells oblong, much elongated; a series of minute incurved denticles along the inner edge of the margin; avicularium large, at the base of a cell, mandible pointed, oblique.

REFERENCE.—Busk, Voy. Ratt., i., 380; Cat. Mar. Pol. Brit. Mus., 49, t. lvi., fig. 7, t. lvii., and t. l., figs. 3 and 4.

Queenscliff and other places.

A very variable species, the only constant character being the minute denticles within the inner edge of the margin of the cells. These can always be detected in some of the younger cells towards the end or sides of the branches. Usually, in addition to the denticles, there is a series of thick, hollow, pointed or blunt processes projecting from the front of the cell margins. These vary much in number, sometimes being only one on each side of the mouth, sometimes two, and frequently a series extending along the whole length of the cell. They are occasionally dentate or bifurcate. The branches of the polyzoary are generally elongated, strap-shaped, dichotomously branched, truncated at the ends. In other specimens they are much broader, more irregularly branched, and rounded at the ends. In a few, the calcareous matter is very deficient, and the frond is so membranous as to present much the color and appearance of a *Carbasea*.

EXPLANATION OF FIGURES.

PLATE 45.—Fig. 1, ordinary specimen, natural size. Fig. 1*a*, broader form, natural size. Fig. 1*b*, membranous form, natural size. Fig. 1*c*, portion of fig. 1, magnified, showing two blunt processes on each side of the mouth. Fig. 1*f*, portion of fig. 1*a*, magnified, showing a series of large pointed processes along the margins of the cells. Fig. 1*e*, cell from near the end of the same specimen, to show the minute sub-marginal denticles. Fig. 1*d*, portion of fig. 1*b*. Fig. 1*g*, cell towards edge of same, showing the sub-marginal denticles.

* In different descriptions "zoarium" is used for "polyzoary," "zoœcium" is used for "cell," and "oœcium" is used instead of "ovicell."

PLATE 45, FIG. 2.

CARBASEA EPISCOPALIS (BUSK).

[Genus CARBASEA (GRAY). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-order Cheilostomata. Fam. Flustridæ.)
Gen. Char.—Polyzoary expanded, foliaceous ; cells contiguous, on one side only.]

DESCRIPTION.—Cells elongated, more or less cylindrical, contracted below, transversely rugose behind ; aperture small. Ovicells mitriform, with a vertical ridge down the centre, and a large opening on each side.
REFERENCE.—Busk, Voy. Ratt., i., 379; Cat. Mar. Pol. Brit. Mus., p. 52, t. xlviii., figs. 1 and 2; t. lv., fig. 3.

Queenscliff ; Kings Island, Mr. McGowan.

At once distinguished by the attenuated, cylindrical cells, with the small rounded apertures. The ovicells are very peculiar, presenting a curious resemblance to a bishop's mitre. The polyzoary is dichotomously divided, 2 or 3 inches high, the branches narrow and delicate.

EXPLANATION OF FIGURES.

PLATE 45.—Fig. 2, specimen, natural size. Fig. 2*a*, portion, magnified, showing the front of the cells. Fig. 2*b*, portion of back, magnified. Fig. 2*c*, ovicells, magnified.

PLATE 45, FIG. 3.

CARBASEA DISSIMILIS (BUSK).

DESCRIPTION.—Cells in front pyriform, only a small portion inferiorly filled in; the marginal cells obliquely truncated above, and with the upper and outer angle produced into a blunt spine, which projects beyond the base of the cell next above ; the cells sometimes unarmed, frequently, especially towards the centre, with a short spine at each upper angle. Avicularia small, at the base of a cell. Ovicell rounded above.
REFERENCE.—Busk, Cat. Mar. Pol. Brit. Mus., p. 51, t. xlix., figs. 4, 5, 6, 7.

Queenscliff; Kings Island, Mr. McGowan.

This is readily distinguished from the other species by the projecting outer angle of the marginal cells. The presence of a small avicularium at the base of most of the cells is also very characteristic. Some of the cells are unarmed, and others have a small short spine at each upper angle. The ovicells are prominent, round above, smooth. Each ovicelligerous cell has a long hollow process on each side, curved inwards and upwards, which, with the avicularium on the cell above, give a very peculiar appearance.

Explanation of Figures.

Plate 45.—Fig. 3, specimen, natural size. Fig. 3*a*, front, magnified, to show projecting upper angles of marginal cells and avicularia at base of other cells. Fig. 3*b*, cells from same specimen, showing small spines at upper angles. Fig. 3*c*, back of some cells. Fig. 3*d*, ovicells, showing also the long curved processes of the ovicelligerous cells and the avicularia at the base of the cells above. (The mandible not satisfactorily shown.)

Plate 45, Fig. 4.

CARBASEA INDIVISA (Busk).

Description.—Cells broad, oblong or obscurely hexagonal, entirely open in front, minutely granular behind. Polyzoary undivided, expanding above, frequently involute, and with the edges united so as to form a more or less perfect cup.

Reference.—Busk, Cat. Mar. Pol. Brit. Mus., p. 53, t. lviii., 3 and 4; *Carbasea cyathiformis*, P. MacGillivray, Trans. Phil. Instit. Vict., 1859.

Queenscliff; Warrnambool, Mr. Watts; Cape Otway, Mr. J. Payter; Portland, Mr. Maplestone.

This species differs from the other *Carbaseæ* in the polyzoary being undivided. In almost all the specimens I have seen, the lateral margins are more or less involute and united inferiorly. It is frequently cup-shaped (var. *cyathiformis*), of which a very beautiful specimen is figured.

Explanation of Figures.

Plate 45.—Fig 4, specimen, natural size. Fig. 4*a*, var. *cyathiformis*, natural size. Fig. 4*b*, front of cells, magnified. Fig. 4*c*, back of cells, magnified.

PLATE 45, FIG. 5.

CARBASEA ELEGANS (BUSK).

DESCRIPTION.—Cells oblong, truncate above and below, slightly filled in below. Cells behind oblong, smooth.

REFERENCE.—Busk, Cat. Mar. Pol. Brit. Mus., p. 53, t. lv., figs. 6 and 7; t. lvi., fig. 3.

Queenscliff; Portland, Mr. Maplestone.

A delicate species, forming tufts closely resembling those of *C. episcopalis*, from which, however, it totally differs in the character of the cells. In the specimen figured, the cells were in very distinct oblique lines; usually they are regularly alternate, as in the back view.

EXPLANATION OF FIGURES.

PLATE 45.—Fig. 5, specimen, natural size. Fig. 5*a*, front of branch, magnified. Fig. 5*b*, back, magnified.

PLATE 45, FIG. 6.

CARBASEA PISCIFORMIS (BUSK).

DESCRIPTION.—Cells entirely open in front, pyriform, frequently slightly expanded below; oblong behind, and contracted in the middle. Ovicells marked with radiating lines.

REFERENCE.—Busk, Cat. Mar. Pol. Brit. Mus., p. 50, t. lv., 1, 2; and t. lvi., fig. 6.

Queenscliff; Portland, Mr. Maplestone.

In this species the branches are not much divided, and they are shorter, broader, and more rounded than in the others.

EXPLANATION OF FIGURES.

PLATE 45.—Fig. 6, specimen, natural size. Fig. 6*a*, front of branch, showing also the ovicells, magnified. Fig. 6*b*, back of cells, magnified.

The Flustra and Carbaseæ on this plate have been presented to the National Museum with the above descriptions by Mr. MacGillivray.

FREDERICK McCOY.

(Polyzoa)

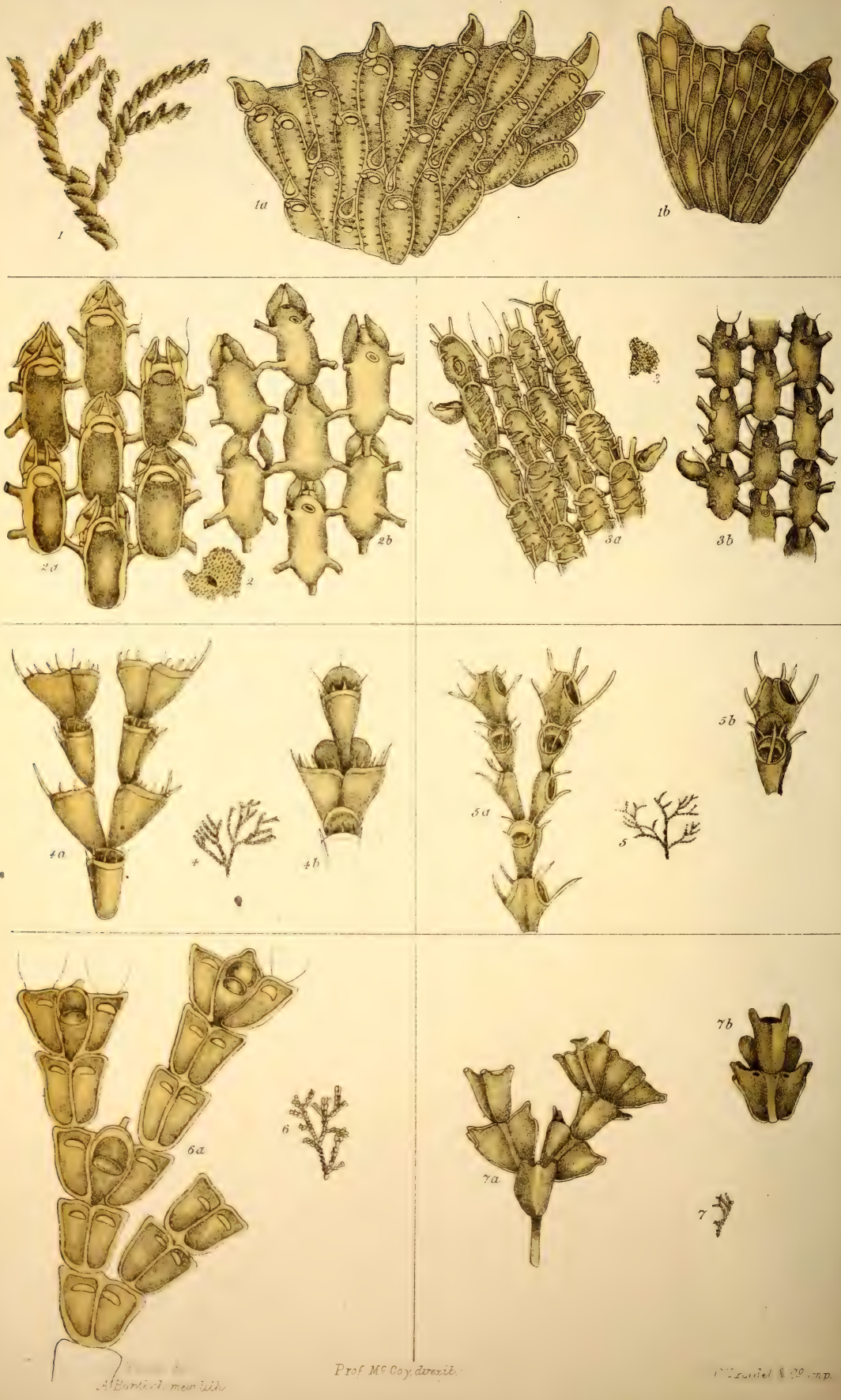


PLATE 46, FIG. 1.

SPIRALARIA FLOREA (BUSK).

[Genus SPIRALARIA (BUSK). Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-Order Cheilostomata. Fam. Flustridæ.)

Gen. Char.—Polyzoary, a narrow and ribbon-shaped lamina spirally twisted round an imaginary axis. Cells in a single layer, opening on the inner surface.]

DESCRIPTION.—The only species.

REFERENCE.—Busk, Mic. Journ., vol. i., new ser., p. 153.

Queenscliff and other localities ; not uncommon.

This beautiful species forms tufts from 1 to 3 or 4 inches high. It consists of a narrow lamina, spirally twisted round an imaginary axis. The branches spring from the margin of the lamina, are from a quarter of an inch to an inch and a half in length, and are usually attenuated at either end. The cells are arranged in a single layer, opening on the inner or upper surface of the lamina. They are irregularly ovoid, generally much narrowed below, separated by raised margins, along each side of which is a row of minute aculeate spines or denticles. The mouth is shallow, wide, arched above, straight or hollowed below. At one side of the mouth there is a digitiform or club-shaped blunt process. The back of the lamina is marked by narrow raised lines running from the base to the margin, and connected by similar cross ribs. These divide the surface into narrow oblong spaces, having no relation to the true cells, than which they are much smaller. There are two forms of avicularia. All the complete cells at the margin are terminated by sessile avicularia. These are very large, occupying the whole width of the cells, and projecting beyond the free edge of the lamina. The mandibles all open towards the same side. There are other smaller sessile avicularia situated on the front of many of the cells. In some specimens those on the cells approaching the margin are larger, and approximate in structure and size to the large projecting terminal ones.

EXPLANATION OF FIGURES.

PLATE 46.—Fig. 1, specimen, natural size. Fig. 1*a*, a small portion of the inner or upper surface of the lamina magnified. Fig. 1*b*, back of the same, showing the division by narrow raised lines into oblong spaces.

* In different descriptions "zoarium" is used for "polyzoary," "zoœcium" is used for "cell," and "oœcium" is used instead of "ovicell."

PLATE 46, FIG. 2.

DIACHORIS MAGELLANICA (BUSK).

[Genus DIACHORIS (BUSK). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-Order Cheilostomata. Fam. Flustridæ.)

Gen. Char.—Polyzoary erect or decumbent. Cells disposed in a single layer, disjunct, each connected with 6 others by regularly arranged tubes.]

DESCRIPTION.—Cells remote, boat-shaped, semi-erect; mouth arched above and straight or hollowed below, with a slightly thickened rim; margin unarmed. A capitate avicularium on each side above, directed nearly vertically, and opening horizontally forwards.

REFERENCE.—Busk, Voy. Ratt., i., 382; Cat. Mar. Pol. Brit. Mus., p. 54, pl. lxvii., figs. 1, 2.

Portland, Mr. Maplestone.

D. Crotali, of which I have specimens, but not received in time for illustration in the present plate, is distinguished by the different form of the avicularium, which is represented by a lanceolate process without any mandible.

EXPLANATION OF FIGURES.

PLATE 46.—Fig. 2, specimen, natural size. Fig. 2*a*, small portion, magnified, showing the front of the cells. Fig. 2*b*, the same, viewed from behind.

PLATE 46, FIG. 3.

DIACHORIS SPINIGERA (P. MACGIL.).

DESCRIPTION.—Cells elongate-oval; 2 or 3 long, straight spines springing from the margin above, and a series, usually about 5, of long slender incurved spines arising from the margin on either side. A large pedunculate avicularium on one side near the mouth.

REFERENCE.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1859.

Queenscliff; Wilson's Promontory, Baron von Mueller; Portland, Mr. Maplestone.

Busk's *D. costata*, of which I have recently received beautiful specimens dredged at Queenscliff by Mr. J. B. Wilson, differs in its smaller size and greater number and length of the spines, which extend more than half way across the apertures, those of opposite sides interdigitating.

Explanation of Figures.

Plate 46.—Fig. 3, specimen, natural size. Fig. 3*a*, front view of cells, magnified. Fig. 3*b*, back view of same.

Plate 46, Fig. 4.

DIMETOPIA SPICATA (Busk).

[Genus DIMETOPIA (Busk). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-Order Cheilostomata. Fam. Gemellariidæ.]

Gen. Char.—Cells joined back to back; each pair arising from the next below, and placed at right angles to it. Cells of the pair at a bifurcation disjunct, and each giving origin to the first pair of a branch.]

Description.—Cells funnel-shaped, contracted below, expanded above. Aperture nearly horizontal or oblique, margin slightly thickened and occupied by a series of stout articulated spines. Ovicell rounded, situated at the upper and inner part of the cell, and projecting above the aperture.

Reference.—Busk, Voy. Ratt., i., p. 384; Cat. Mar. Pol. Brit. Mus., p. 35, pl. xxix., fig. 1.

Queenscliff; Cape Otway; Portland, Mr. Maplestone; not uncommon.

Forms handsome, dense, whitish tufts, 1 to 2 inches high. The cells are of considerable size, infundibulate. The aperture is nearly horizontal, or sloping obliquely outwards and downwards; its margin is occupied by a thickened band, and has a series of usually 4 or more articulated spines; of these, the outer or median is frequently much larger than the others. The ovicell is rounded or ovoid, and situated above and to the inner side of the aperture.

Explanation of Figures.

Plate 46.—Fig. 4, specimen, natural size. Fig. 4*a*, portion, magnified. Fig. 4*b*, small portion, to show the ovicells.

PLATE 46, FIG. 5.

DIMETOPIA CORNUTA (BUSK).

DESCRIPTION.—Cells with the aperture very oblique, wider above and nearly triangular; margin thickened, with a spine at each upper angle and 1 or occasionally 2 at the lower. Ovicells nearly globular, above and to the inner side of the aperture.

REFERENCE.—Busk, Voy. Ratt., i., p. 384; Cat. Mar. Pol. Brit. Mus., p. 35, pl. xxix., figs. 2, 3.

Queenscliff; Sealer's Cove, Baron von Mueller; Portland, Mr. Maplestone.

This is of considerably smaller size than the last species. The cells are much smaller; the opening is very oblique, and much wider above; the margin is thickened, but not with the same deep band as in *D. spicata*, and there are usually 3 spines, 1 from each angle superiorly, and 1, or occasionally 2, from the middle in front. The ovicell is small, round, and situated above and to the inner side of the aperture.

EXPLANATION OF FIGURES.

PLATE 46.—Fig. 5, specimen, natural size. Fig. 5*a*, portion, magnified. Fig. 5*b*, small portion, showing an ovicell.

PLATE 46, FIG. 6.

DIDYMIA SIMPLEX (BUSK).

[Genus DIDYMIA (BUSK). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-Order Cheilostomata. Fam. Gemellariidæ.)

Gen. Char.—Cells joined side to side, all facing the same way, each pair arising from the pair next below it; aperture large, wholly anterior; at a bifurcation cells not disjunct, and each giving origin to a pair.]

DESCRIPTION.—The only species.

REFERENCE.—Busk, Voy. Ratt., p. 383; Cat. Mar. Pol. Brit. Mus., p. 35, pl. xxxix.

Queenscliff; Portland, Mr. Maplestone.

Forms handsome, whitish, or brownish-white curling tufts. The cells are very large, with a thick margin, the upper and outer angles of which form sharp conical processes ; mouth arched above and straight below. The ovicells are very peculiarly situated. At certain bifurcations, a cell is intercalated between the two ordinary ones of a pair ; it is pyriform and slightly anterior, with the upper extremity produced into a process directed upwards and forwards ; the large mouth is situated at or below the middle of the cell, and in a separate compartment above this the large rounded ovicell is seen through the membrane.

Additional view of ovicell of *D. simplex*, as shading of plate is indistinct.

Explanation of Figures.

Plate 46.—Fig. 6, specimen, of natural size. Fig. 6*a*, portion, magnified, showing arrangement of cells, bifurcation, and ovicells.

Plate 46, Fig. 7.

CALWELLIA BICORNIS (Wyv. Thomson).

[Genus CALWELLIA (Wyv. Thomson). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-Order Cheilostomata. Fam. Gemellariidæ.)

Gen. Char.—Cells joined back to back, each pair at right angles to those above and below ; the cells of each pair connected by tubes with the pair next but one below ; cells at a bifurcation not disjunct, and each giving origin to the first pair of a branch.]

Description.—The only species.

Reference.—Wyville Thomson, Dublin Natural Hist. Review, April 1858.

Queenscliff.

Of this species, I have only seen a few small fragments growing on other polyzoa, and it was difficult to find a portion sufficiently perfect for illustration. The connection of the cells is very peculiar, and is similar to what occurs in the European *Notamia bursaria*. Each pair of cells is connected with the next but one below by tubes, which pass round and in the hollow between the cells of the

intermediate pair. The mouth is nearly horizontal, and on each side of it the cell is produced into a thick, conical, hollow process. The small round ovicells are situated above and behind the aperture. In some specimens the ovicells are smooth, in others they are more or less distinctly marked like a miniature Clam-shell, as described and figured by Thomson. It is quite possible that there may be more than one species, but the specimens in my possession are not sufficiently perfect to enable me to say with certainty.

EXPLANATION OF FIGURES.

PLATE 46.—Fig. 7, specimen, natural size. Fig. 7*a*, portion, magnified; the lower part has been a little twisted. Fig. 7*b*, showing two ovicells. The specimen was not sufficiently perfect to show the markings described by Thomson.

The descriptions and specimens of the Polyzoa on this plate have been contributed to this work and the National Museum by my friend Mr. McGillivray.

FREDERICK McCOY.

(Bryozoa)

J Ringer del.
A Barthoumew lith.

Govt Printer Melb.

C Troedel & Co imp

PLATE 47, FIG. 1.

DICTYOPORA CELLULOSA (P. MACGIL.).

[Genus DICTYOPORA (P. MACGIL.). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-Order Cheilostomata. Fam. Escharidæ.)
Gen. Char.—Polyzoary stony, expanded, foliaceous, fenestrate, articulated by a flexible stem; cells horizontal, opening on both sides.]

DESCRIPTION.—Polyzoary expanded, proliferous, and cavernous; fenestræ round, narrower than the interspaces; cells distinct, mouth nearly circular; a large avicularium on the front of each cell below the mouth, with the mandible pointed obliquely upwards and outwards.
REFERENCE.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

Queenscliff.

Of this handsome species, the largest specimen I have seen is the one figured, which is 9 inches high by 16 in circumference at its thickest part. In young specimens the color is deep brown, but this becomes much lighter with age. The flexible stem by which the polyzoary is attached is short, and is marked by narrow, transverse, broken, coriaceous ridges, which are joined by masses of short, tubular, vertical fibres. In old specimens the stem becomes more rigid, from the deposit of calcareous matter. The polyzoary is expanded, foliaceous, proliferous, and variously twisted to form a cavernous mass like a large Retepore. The cells are distinct, with a small circular mouth, with a thickened margin. The avicularia are very large, usually on the front and side of the cell, pointed obliquely upwards and outwards, and with the mandible reaching to opposite the middle of the cell-mouth. At the lower part of the polyzoary the surface is occasionally elevated into obscure rounded ridges, extending for a short distance upwards. The fenestræ are round, variable in size, but always narrower than the interspaces. The size of the compartment formed by the twisting and junction of the lamina varies, in some specimens the polyzoary being flatter and with very few divisions.

Lamouroux founded the genus *Adeona* to contain two Australian zoophytes, characterised by the stony expanded frond being sup-

* In different descriptions "zoarium" is used for "polyzoary," "zoœcium" is used for "cell," and "oœcium" is used instead of "ovicell."

ported by a flexible stem. One species, *A. foliacea*, Lamx. (*A. foliifera*, Lamck.) is described as entire, and the other, *A. grisea*, Lamx. (*A. cribriformis*, Lamck.), as cribriform, or perforated by round foramina. These two forms ought evidently to be referred to distinct genera, and the latter would come under the present genus. Adopting the name *Dictyopora* for the fenestrate species, the generic name *Adeona* might be retained for the species with the polyzoary entire.

Since the above description was written, I have received, through the courtesy of the author, an early copy of a valuable memoir on *Adeona* by Dr. Kirchenpauer of Hamburg. He describes eight species, and considers that one (*A. intermedia*) shows the transition between the entire and the fenestrated forms, and therefore combines them all in the same genus. From an examination of his description and figures, I am, however, unable to agree with him, as it seems to me that the fenestræ of *A. intermedia* are merely formed by the accidental and irregular overlapping and coalescence of the branches, and that the structure is essentially different from what occurs in the regularly fenestrate species. A similar irregular inosculation occasionally takes place in Eschara, and is shown in *E. platalea*, plate 48, fig. 4, of the present Decade.

Mr. J. B. Wilson has recently presented to the Museum specimens of *D.* (*Adeona*) *grisea*, and another species which seems to be identical with Kirchenpauer's *Adeona albida*. They were dredged off Queenscliff, and will shortly be described and figured.

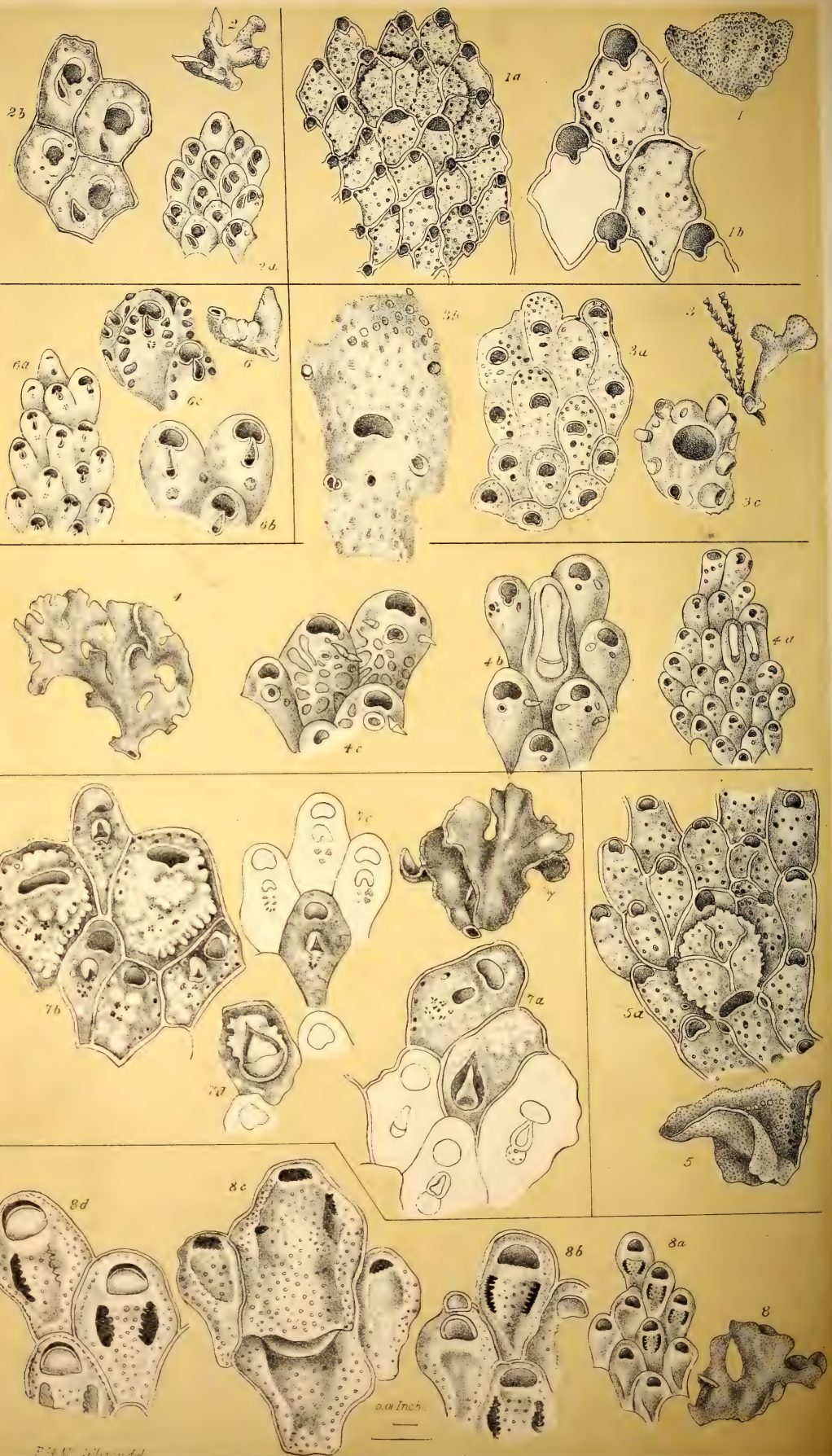
Explanation of Figures.

Plate 47.—Fig. 1, specimen, natural size. Fig. 1*a*, small group of cells, magnified. Fig. 1*b*, two cells, more highly magnified. Fig. 1*c*, two old cells, denuded of ectoderm, magnified to the same extent as the last figure. Fig. 1*d*, section, showing the cells arranged in a double layer.

Fine specimens of this grand form have been presented to the Museum with the above description by the discoverer, Mr. McGillivray.

Frederick McCoy.

'Polyzoa'



P.H.W. del. et lyd.
A. Barthelomew lith.

Prof. M.C. Sig. sarent.

C. Troedel & C.o imp.

PLATE 48, FIG. 1.

ESCHARA OBLIQUA (P. MACGIL.).

[Genus ESCHARA (RAY). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-Order Cheilostomata. Fam. Escharidæ.)

Gen. Char.—Polyzoary foliaceous or lobed, not perforated. Cells with the walls complete in front, opening on both surfaces, coalescent, placed back to back, and horizontal to the plane of the axis.]

DESCRIPTION.—Polyzoary foliaceous; cells obliquely rhomboidal, separated by raised smooth lines; surface tubercular and perforated; mouth arched above, with a considerable sinus in the lower lip. Ovicell large, granular, and perforated, and traversed by smooth raised lines like those separating the cells.

REFERENCE.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

Schnapper Point; a single specimen.

In the only specimen I have seen, the cells form series in an arched direction laterally. They are mostly obliquely rhomboidal, with the mouth in the upper angle; the surface is tubercular, with numerous small perforations among the tubercles. The ovicells are large, spreading over more than one cell, and with raised lines, marking the limits of the cells beneath. The mouth of the ovicelligerous cell is much wider, and the sinus in the lower lip much shallower.

EXPLANATION OF FIGURES.

PLATE 48.—Fig. 1, specimen, natural size. Fig. 1*a*, portion, magnified. Fig. 1*b*, two cells and outline of another, more highly magnified; in one cell the mouth is obliterated by the deposition of calcareous matter.

PLATE 48, FIG. 2.

ESCHARA DISPAR (P. MACGIL.).

DESCRIPTION.—Polyzoary small, divided into thick lobes; cells immersed, slightly projecting, and rounded above; mouth lofty, projecting, and spout-like above, with a sinus below. An avicularium on one side of the mouth, with the acute mandible pointed upwards.

REFERENCE.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

* In different descriptions "zoarium" is used for "polyzoary," "zoœcium" is used for "cell," and "oœcium" is used instead of "ovicell."

Queenscliff.

I have only seen a single small perfect specimen of this species. It is divided into short, thick, branched lobes. The cells are immersed, the upper part convex and bulging forwards ; the mouth is lofty, arched, the upper part much deeper and spout-like, in consequence of the bulging forwards of that part of the cell. The lower lip has a deep sinus. The cells are wholly or partially separated by fine faintly raised lines. The surface is faintly granular, some of the cells having a few slightly projecting elevations round the mouth, and many of the old cells towards the base being areolated. The cells at the apex of the lobes have no avicularia ; most of the others have one below and to the side of the mouth, with the long pointed mandible directed upwards. Towards the base of the polyzoary the cells are indistinct, deeply areolated, no mouths in some parts apparent, but only a few scattered avicularia. This change is due to the increased deposition of calcareous matter in the older cells as takes place in other stony Escharæ.

Explanation of Figures.

Plate 48.—Fig. 2, specimen, natural size. Fig. 2*a*, portion, magnified. Fig. 2*b*, a few cells, more highly magnified, to show the form of the mouth and the situation and form of the avicularia.

Plate 48, Fig. 3.

ESCHARA GRACILIS (Lamx.).

Description.—Polyzoary forming thick, narrow, rounded, branches; cells deeply immersed, bulging above; mouth rounded, with a thickened lip, and frequently a projecting process or denticle inside the lower lip; a round pore on the front of the cell below the mouth. Avicularia small, broad, with a short rounded mandible. Ovicells immersed.

Reference.—Busk, Cat. Mar. Pol. Brit. Mus., p. 91, t. cviii., figs. 5, 6, 7.

Queenscliff.

The only specimen I have seen is the one figured. The cells are immersed and indistinct. The surface is marked with close

areolations ; at the growing apex these are seen to be the openings of close-set tubes, which give that part of the polyzoary a spongy or honeycomb appearance ; further towards the base they become filled with calcareous matter. In some cells there are one or more rounded elevations in the neighborhood of the mouth ; these are plain, or have what seems to be an avicularium on the side of the apex. In almost all the cells there is a round pore below the mouth. The avicularia are very small, short, and broad, and are usually situated on the interstices between the cells or on the prominences round the mouth. The ovicells are deeply immersed, indistinguishable from the other cells except for the larger projection upwards.

Explanation of Figures.

Plate 48.—Fig. 3, specimen, natural size. Fig. 3*a*, a portion, magnified, showing the ovicells at the upper part. Fig. 3*b*, single cell and ovicell, more highly magnified, showing also the minute avicularia. Fig. 3*c*, part of a young cell, showing the mouth and elevations surrounding it, on the outer part of several of which is what seems to be a small avicularium.

Plate 48, Fig. 4.

ESCHARA PLATALEA (Busk).

Description.—Polyzoary dividing into flat, thick lobes, branching and sometimes anastomosing; cells ovate; mouth arched above, straight below; a simple, round pore in a depressed area below the mouth. Avicularia of two sorts: small, and usually situated below the mouth and to one side, or replacing a cell, very large, and with a long, spatulate mandible.

Reference.—Busk, Cat. Mar. Pol. Brit. Mus., p. 90, t. cv., figs. 1, 2, 3; cviii., fig. 4.

Queenscliff.

In this species the polyzoary is stony, disposed in flat lobulated branches, which sometimes anastomose together so as to leave linear or elliptical foramina. The junctions of the branches can be readily distinguished, and they frequently overlap. The cells are usually ovate. The mouth is rounded above, and straight or rounded below. There is generally a simple round pore at the bottom of a depression below the mouth. The surface is smooth, granular, or

areolated. The cells at the margins of the foramina are generally considerably larger. In one specimen, those on the extreme growing edge are perforated or fenestrate, and without the suboral pore ; those adjoining, however, present the usual structure. As in other Escharæ, the openings of the cells towards the base of the polzyoary become overgrown. The avicularia are of two sorts. In many cells there is a small avicularium, on one or both sides, below the mouth, with the pointed mandible directed more or less outwards. The other avicularia are very large, and take the place of a cell. In them the mandible is spoon-shaped, and of enormous size. They frequently occur grouped two or three together, and in the specimen figured are especially abundant at the edges of the openings formed by the anastomoses of the branches. In some of these the mandible is shorter and occasionally pointed, and the supporting basis is very prominent when seen in profile.

E. platalea is distinguished from the other Victorian stony species with which I am acquainted by the narrow, flat, anastomosing lobes, the simple suboral pore, the size and shape of the large, scattered, spoon-shaped avicularia, and the situation of the small ones on the front of the cells.

Explanation of Figures.

Plate 48.—Fig. 4, specimen, natural size. Fig. 4*a*, portion, magnified. Fig. 4*b*, cluster of cells, more highly magnified, showing the small avicularia and a single, large, spatulate one. Fig. 4*c*, small group, to show 2 large cells towards the edge of a lobe and a smaller one to the side.

Plate 48, Fig. 5.

ESCHARA QUADRATA (P. MacGil.).

Description.—Polyzoary expanded, foliaceous, convoluted; cells quadrate, separated by narrow raised lines and arranged in longitudinal linear series; surface granular and perforated; mouth arched above, lower lip arched upwards and projecting, a minute, curved denticle sometimes on each side of the mouth immediately above the angles. Avicularia, when present, situated at the side of the mouth. Ovicell large, granular, with lines on the surface similar to those separating the cells.

Reference.—*Eschara elegans,* P. H. MacGillivray (not Milne Edwards), Trans. Roy. Soc. Vict., 1868.

Queenscliff; Portland.

The only Victorian species at all resembling this is *E. obliqua*, the polyzoary of which is thicker. The situation and form of the mouth also, as well as the shape of the cells, are different. The avicularia are very rare; they are small, short, broad, and situated on each side below the mouth, directed downwards; they seem to be more frequently present on the cells supporting the ovicells. The ovicells are similar to those of *E. obliqua*, and, like them, are traversed by raised lines.

Explanation of Figures.

Plate 48.—Fig. 5, specimen, natural size. Fig. 5*a*, portion, magnified; two avicularia are shown on the cell supporting the ovicell (they should appear more distinct from the raised margin, with a downward direction).

Plate 48, Figs. 6 and 7.

ESCHARA MUCRONATA (P. MacGil.).

Description.—Polyzoary stony, expanded, laminate or lobed; cells ovate, with a stellate pore or group of pores in the middle; mouth rounded above. An avicularium below the mouth, the mandible directed vertically upwards, and the beak usually projecting above the lower lip.

Reference.—*Lepralia mucronata*, P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

Queenscliff and Schnapper Point.

What may be taken as the typical young cell of this species is ovoid, smooth, or minutely granular. There is a vertical avicularium immediately below the mouth, the mandible pointing directly upwards, and the beak very calcareous and frequently projecting as a mucro over the edge of the lower lip, with which it is incorporated. There is a small, round group of stellate pores on the middle of the cell. The cells are indistinct, or separated by fine lines. In some of the small cells there is a series of perforations along the edge. In older specimens, and removed from the growing edge, the cells become much altered, principally by the deposition of

calcareous matter. This frequently accumulates largely round the suboral avicularium, in an agglomeration above the mouth, and in rounded elevations along the sides of the cells. In those cells there are usually several round perforations on the outer edges of the lateral nodules. The cells are also separated by distinct raised lines. In some specimens a certain number of cells, frequently grouped in close proximity, are very much larger. These large cells differ also in having the mouth much wider and shallower, and in the stellate pores not being confined to a small group, but being more numerous and scattered over the whole of the central part of the cell. They are frequently covered with rounded calcareous masses along, but separated from, the edges, similar masses being heaped up about the avicularium, which is sometimes completely obscured by them, and also above the mouth. It is difficult to say what these cells are, unless they are connected with the ovicells. Besides the suboral, vertical avicularia, there are, in some specimens, a few others very large and taking the place of cells, as happens in *E. platalea.* The mandible is large and triangular. They are mostly situated among the calcareous cells, and their basis assumes the same appearance.

E. mucronata may be always distinguished by the vertical suboral avicularium and the central group of stellate pores.

Explanation of Figures.

Plate 48.—Fig. 6, the specimen described as *Lepralia mucronata*, natural size. Fig. 6*a*, a portion of the same, magnified. Fig. 6*b*, a few cells, more highly magnified, showing the simplest form. Fig. 6*c*, cells from the same specimen, showing the perforated margin.

Fig. 7, another specimen, natural size. Fig. 7*a*, a portion, magnified (the same extent as 6*b* and 6*c*), showing a large solitary avicularium ; the cells are unusually large, and the upper one approaches the characters of the very large ones. Fig. 7*b*, small group, to show two of the very large cells ; in these there is a large deposit of calcareous matter obscuring the suboral avicularium ; the wide mouth and scattered pores are shown ; the smaller cells show the accumulation of calcareous matter about the avicularium, which in the lowest is completely covered over. Fig. 7*c*, cells from another large specimen ; in many cells of this it was difficult to make out with certainty the stellate pores, owing seemingly to the presence of epidermis, but in a considerable number they were quite apparent as figured ; throughout, the calcareous matter was mostly accumulated on the avicularia and above the mouth. Fig. 7*d*, a separate avicularium from the same specimen, showing an increased deposit of calcareous matter.

PLATE 48, FIG. 8.

CALESCHARA DENTICULATA (P. MACGIL.).

[Genus CALESCHARA (P. MACGIL.). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-Ord. Cheilostomata. Fam. Escharidæ.)

Gen. Char.—Polyzoary expanded, foliaceous, erect, not perforated. Cells horizontal, opening on both surfaces, separated by raised lines, and depressed in the centre. Front calcareous, except a small part anteriorly, which is membranous.]

DESCRIPTION.—Polyzoary small, foliaceous, convoluted. The cells are wide and rounded above, contracted below, separated by raised, smooth, or minutely crenulated margins. The front is depressed in the centre, and is covered by a membrane, through which the deeper calcareous layer may be obscurely seen. When this is removed, as it frequently is by attrition or decay, the edges are seen to be bevelled inwards, and about a sixth or a fourth part of the front within the bevelled portion is entirely membranous; the arched mouth is situated at the upper part of this. The rest of the front is calcareous, except a large slit on each side. At the junction of the membranous anterior part there is an increased deposit of calcareous matter, forming a thickened convex band, the anterior edge of which is smooth or finely denticulate, or tubercular. The outer edge of the slit-like opening corresponds to the inner bevelled margin. It is granular, like the bevelled part. The inner edge is produced into a series of minute, pointed, horizontal denticles. The lamina between the slits slopes backwards on each side, and is occupied by numerous pores or small tubercles. In some cells there is a small, rounded prominence in the angle above the mouth which might be mistaken for a minute ovicell. The ovicelligerous cell is very large, and the ovicell is wide, little projecting, and incorporated with the cell above, which also is of unusual size.

REFERENCE.—*Eschara denticulata,* P. H. MacGillivray, Trans. Roy. Soc. Vict., 1869.

Queenscliff; Schnapper Point; Warrnambool, Mr. Watts.

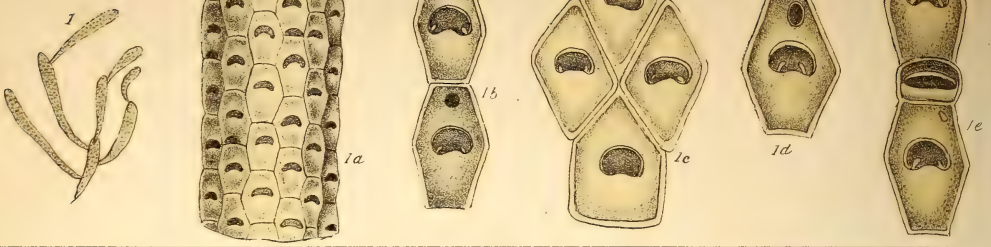
This differs from the old genus Eschara in the anterior part of the cell being membranous, and the front depressed in the centre. The membranous part varies considerably in extent, and in some cells the mouth seems to occupy the whole aperture, the thickened calcareous band resembling a lower lip, while in others the operculum occupies only a small portion. All the specimens I have seen have been cast on the beach and been dried, so that it is impossible to say whether the anterior membranous layer is closely adherent to the calcareous lamina.

EXPLANATION OF FIGURES.

PLATE 48.—Fig. 8, specimen, natural size. Fig. 8*a*, portion, magnified. Fig. 8*b*, small portion, more highly magnified, one cell still covered with the membranous layer, the other showing the calcareous lamina and denticulate openings. The small round prominence above the cell on the left has the margin too distinctly rimmed. Fig. 8*c*, group, to show the ovicell. The cells, except the anterior part of that with which the ovicell is incorporated, are still covered with membrane, and the large operculum of the large cell is seen projecting below the opening of the ovicell. Fig. 8*d*, small group, to show the anterior membranous part. There is frequently a much larger portion occupied by membrane than is here represented.

All the *Escharidæ* on this plate have been described, and specimens of each presented to the National Museum, by Mr. MacGillivray.

FREDERICK MCCOY.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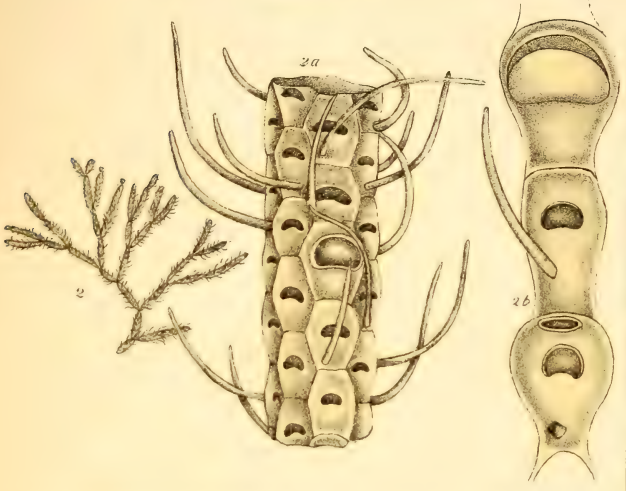
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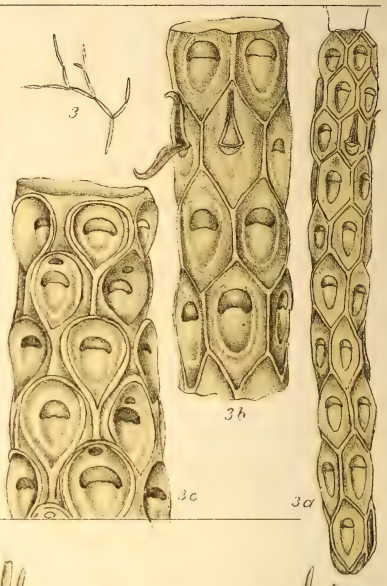
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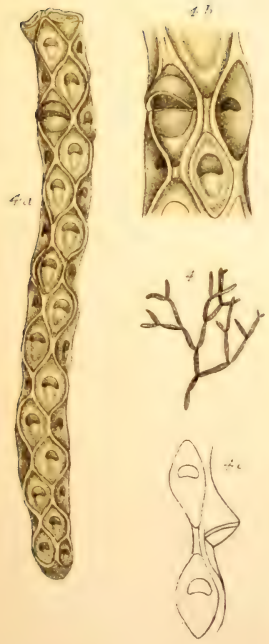
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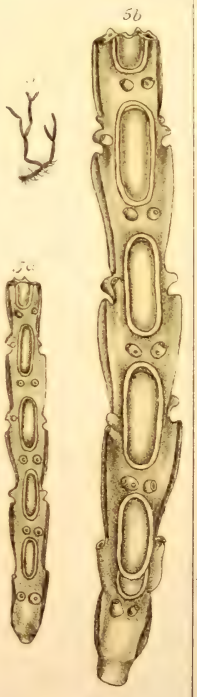
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6
6a

PLATE 49, FIG. 1.

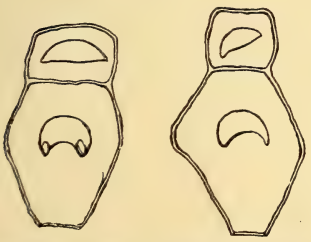
CELLARIA FISTULOSA (LINN.).

[Genus CELLARIA (LAMX.) = SALICORNARIA (CUVIER). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-Order Cheilostomata. Fam. Salicornariidæ.)
Gen. Char.—Cells distinct, separated by raised margins, much depressed in front; no aperture.]

DESCRIPTION.—Internodes long and thick; cells in a series contiguous, usually elongated and six-sided, straight or slightly arched above and below; surface finely granular or nearly smooth; separating margins smooth or finely crenulated on the edges; mouth central, arched above, lower lip arched upwards and forwards, with frequently a minute rounded denticle inside each angle. Avicularia placed between two cells in a longitudinal series, mandible shallow, wide, rounded above, and directed upwards. Ovicell opening by a round pore.
REFERENCE.—*Salicornaria farciminoides*, Busk, Cat. Mar. Pol. Brit. Mus. p. 16, t. lxiv., figs. 1, 2, 3; t. lxv. (*bis*), fig. 5; Hincks, Brit. Mar. Polyzoa, p. 107, pl. xiii., figs. 1–4.

Queenscliff; Portland, Mr. Maplestone; on roots of algæ.

The internodes are of large size, sometimes three-quarters of an inch long, and thick, containing numerous series of cells. The usual form of the cells is elongated hexagonal, straight or slightly arched above and below; occasionally they are rhomboidal or five-sided. The surface is minutely granular. The mouth is generally central, but in some portions, especially at the growing extremities, it is nearer the upper end of the cell. The upper lip is arched, smooth or minutely crenulate; the middle of the lower lip usually projects forwards and upwards, and there is frequently a small denticle on either side. The ovarian pores are round, sometimes elongated longitudinally or transversely. The avicularia do not take the place of cells, but are placed between those of a longitudinal series, and are distinct from them; the mandible is very wide, shallow and convex above, and is directed upwards.



Additional views of cells and avicularia of *C. fistulosa*, magnified fifty diameters, as shading in plate is not satisfactory.

* In different descriptions "zoarium" is used for "polyzoary," "zoœcium" is used for "cell," and "oœcium" is used instead of "ovicell."

There has been great confusion about the European species *C. fistulosa* and *C. sinuosa*, and, judging from the descriptions and figures, I thought this a distinct species, and had marked it *C. australis*. *C. sinuosa* is distinguished by the large, frequently oblique avicularium, with a triangular, acutely pointed mandible directed downwards. According to Busk (Crag Polyzoa, p. 23) the mandible in *C. fistulosa* is small, semicircular, blunt; and it is so figured in the British Museum Catalogue, where the two species are united. Smitt describes the mandible as semicircular, and figures it as very small. Hincks, however, in his recently published British Marine Polyzoa, describes the mandible as being very shallow and arcuate, and one of his figures (pl. xiii., fig. 3) differs from our form only in being rather narrower. The Australian specimens seem to be stouter, with a larger number of series in the cylinders, and might be named var. *australis*.

There is no doubt that the generic name of *Cellaria*, as defined by Lamouroux, ought to be retained for the present genus, and it is equally proper that the specific name *fistulosa*, originally given by Linnæus, although in reality incorrect, should be adopted.

EXPLANATION OF FIGURES.

PLATE 49.—Fig. 1, specimen, natural size. Fig. 1*a*, portion of an internode, magnified. Fig. 1*b*, 2 cells, more highly magnified, showing the ovarian pores. Fig. 1*c*, group of cells from another portion of the same specimen. Fig. 1*d*, single cell, showing a large, oval, ovarian pore. Fig. 1*e*, 2 cells, with an avicularium between them; in each cell a small rounded ovarian pore is shown situated towards one side of the upper part. (The avicularium is not properly shaded.)

PLATE 49, FIG. 2.

CELLARIA HIRSUTA (P. MACGIL.).

DESCRIPTION.—Cells in a series contiguous; surface granular; mouth central, lower lip arched upwards, usually with a minute denticle at either side internally; a long corneous tubular process from the base of the cell. Avicularium replacing a cell; mandible very large, semicircular. Ovicell opening by a lunate pore.

REFERENCE.—*Salicornaria id.*, P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

Queenscliff; Portland, Mr. Maplestone; frequent.

Forms tufts 1 to 2 inches high. The cylinders frequently present, towards the superior extremity, swollen portions corresponding to the situation of the immersed ovicells. The form of the cell varies, being hexagonal, rhomboidal, with the upper and lower edges straight, or the upper arched or pointed; frequently the upper end is arched, and the lower part much contracted. The forms of the cells are very similar to those described in the last species. At the base of each cell there is generally a long, hollow, corneous process; in some specimens each cell has 2; and occasionally they are wanting, but never from all the cells of a polyzoary; they are distinct from the radical tubes, which may be occasionally seen arising from the same cells at the base of an internode. The ovicell is totally immersed; the ovarian pore is widely lunate, at the summit of an ordinary cell. The avicularium is of great size. It takes the place of a cell in a series; it is larger than the adjacent cells and of a similar form; the mandible is very large, semicircular, and occupies about a third of the cell.

Explanation of Figures.

Plate 49.—Fig. 2, specimen, natural size. Fig. 2*a*, portion of internode, magnified. Fig. 2*b*, small portion of a series, more highly magnified, showing above an avicularium, and in the lower cell an ovarian pore.

Plate 49, Fig. 3.

CELLARIA TENUIROSTRIS (Busk).

Description.—Polyzoary small, formed of long narrow cylinders; cells in a series distant, elongated, usually hexagonal and pointed above and below, sometimes wide and arched above; mouth arched above, lower lip arched forwards, and sometimes with a minute denticle at either side. Ovicell deeply immersed, opening by a round pore at the upper part of a cell. Avicularium replacing a cell, mandible very long, narrow, and pointed upwards.

Reference.—*Salicornaria id.*, Busk, Cat. Mar. Pol. Brit. Mus., p. 17, pl. lxiii., fig. 4.

Queenscliff; Sealer's Cove and Cape Le Febre, Baron von Mueller.

This species forms small glassy tufts. The internodes are narrow, and consist of a few series of cells. The cells are usually nearly hexagonal and pointed above and below ; the separating margins are much raised, generally smooth ; the surface also is smooth or very obscurely granular. The mouth is situated rather above the middle ; the upper lip is lofty and arched ; the lower lip is also arched upwards, and frequently has a small denticle at either end. In some specimens the cells are much wider and rounded above. These are more frequently found in the expanded portions where the deeply immersed ovicells are situated. The ovarian pores are small, and situated at the upper part of a cell. The avicularia take the place of cells in a series ; the mandible is very long and narrow.

Explanation of Figures.

Plate 49.—Fig. 3, specimen, natural size. Fig. 3*a*, an internode, magnified. Fig. 3*b*, small portion, more highly magnified, showing 2 avicularia. Fig. 3*c*, small portion of the form with the wider cells rounded above, and showing the ovarian pores.

Plate 49, Fig. 4.

CELLARIA GRACILIS (Busk).

Description.—Polyzoary small; cells in a series distant, elongated, hexagonal, usually pointed above and below; surface minutely granular; mouth at or above the middle, arched above, lower lip also slightly arched upwards. Avicularium replacing a cell, mandible very large and semicircular.

Reference.—*Salicornaria id.*, Busk, Cat. Mar. Pol. Brit. Mus., p. 17, pl. lxiii., fig. 3 ; pl. lxv. (*bis*), fig. 2.

Queenscliff ; Sealer's Cove, Baron von Mueller.

In this and the preceding species, the size and habit of growth, and the size and appearance of the cells, are very similar, and in the absence of the avicularia it would be impossible to distinguish them with certainty. These organs, however, are very characteristic. In both they take the place of cells in a series. In *C. tenuirostris* the mandible is long, narrow, and pointed upwards, while in

C. gracilis it is very broad and semicircular. I have not seen the ovarian pores in the present species.

Explanation of Figures.

Plate 49.—Fig. 4, specimen, natural size. Fig. 4*a*, an internode, magnified. Fig. 4*b*, small portion, more highly magnified, showing an avicularium. Fig. 4*c*, outline of 2 cells and profile of avicularium, to show the projection of the rostrum.

Plate 49, Fig. 5.

NELLIA OCULATA (Busk).

[Genus NELLIA (Busk). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-Order Cheilostomata. Fam. Salicornariidæ).
Gen. Char.—Cells distinct, convex in front, aperture large.]

Description.—Cells quadriserial, few in each series (about 4 or 5), projecting above, of nearly uniform width; aperture large, of same width throughout, rounded above and below, and with a thickened margin; 2 small, hollow, rounded processes below the aperture, perforated at the summit by 1 or 2 minute openings, which are occasionally occupied by avicularia.
Reference.—Busk, Cat. Mar. Pol. Brit. Mus., p. 18, pl. lxiv., fig. 6; pl. lxv. (*bis*), fig. 4.

Parasitic on algæ and zoophytes, Queenscliff.

Forms small glassy tufts. It is readily recognised by the shape of the aperture, and the presence of the 2 rounded hollow processes at the base of the cell. These processes are pierced by 1 or occasionally 2 small apertures on the summit. According to Smitt (Floridan Bryozoa), these apertures are occupied by small avicularia, and in a few instances I have been able to detect them. The upper part of the cell, when seen in profile, forms a marked projection below the submarginal processes of the cell above.

Explanation of Figures.

Plate 49.—Fig. 5, specimen, natural size. Fig. 5*a*, internode, magnified. Fig. 5*b*, the same, more highly magnified.

PLATE 49, FIG. 6.

TUBUCELLARIA HIRSUTA (BUSK).

[Genus TUBUCELLARIA (D'ORBIGNY) = ONCHOPORA (BUSK) in part. (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-Order Chielostomata. Fam. Salicornariidæ.)

Gen. Char.—Cells convex, ventricose, confluent, indistinct; mouth produced into a tube; no raised margin, and no aperture.]

DESCRIPTION.—Polyzoary of rather short internodes; mouth prolonged forwards into a slightly projecting tube; on each side below the tubular portion a long, hollow, jointed, tubular process is articulated.

REFERENCE.—*Onchopora id.*, Busk, Mic. Journ., vol. iii., p. 320.

Queenscliff; Western Port, Sir George Verdon; Cape Otway, Mr. J. Payter; Portland, Mr. Maplestone.

This very peculiar species occurs in tufts, 1 to 2 or 3 inches high. The internodes are short and thick. The cells are of large size; the surface (in dried specimens) divided into minute areas bordered by chain-like rows of small punctations. The mouth of the cell projects slightly in a tubular form, and on each side, at the commencement of this projection, is a long, hollow, jointed corneous process. This is quite different from the radical processes, which are of about the same thickness, and may be occasionally seen at the base of an internode, twisted cable-like and curled at the ends. There is in many cells a small round or oval, raised pore below the mouth. This is frequently wanting, and is probably an avicularium.

EXPLANATION OF FIGURES.

PLATE 49.—Fig. 6, specimen, natural size. Fig. 6, small portion, magnified.

All the specimens of *Salicornariæ* figured on this plate have been presented with the above descriptions by Mr. MacGillivray.

FREDERICK MCCOY.

1
1a
1b
1c
1d
2
2a
2b
2c
2d
2e
3
3a
3b

4
4a
5
6

PLATE 50, FIG. 1.

CICADA MŒRENS (GERM.).

THE GREAT BLACK, OR MANNA CICADA.

[Genus CICADA (LINN.). (Sub-kingd. Articulata. Class Insecta. Order Hemiptera. Tribe Homoptera. Sect. Trimera. Fam. Cicadidæ. Sect. Octicella.)

Gen. Char.—Head large, wide, short. Eyes round, of moderate size, very prominent, above the anterior edge of the prothorax; 3 small ocelli in a group on top of head. Prothorax transverse, not dilated at the sides; mesothorax not deeply notched behind. Sound-drums of males moderately open above, not forming large sacks on the sides; opercula not much lengthened. Tarsi of 3 joints.]

DESCRIPTION.—Above, and legs, and veins of wings, brownish-black, with few greyish hairs, most numerous on the sides of the abdominal segments; two yellowish-brown spots, their own diameter apart, on middle of posterior edge of mesothorax, and two much smaller spots of bright amber hairs, one at each anterior lateral angle; underside of abdomen light-yellowish brown; eyes orange; ocelli red; anterior wings with an oblique *W*-shaped brown mark on transverse veins at distal ends of 1st and 2nd disc-areolets; hinder wings with distal edges of marginal areolets thickened with dark-brown. Length of body, 1 inch 5½ lines; length of anterior wing, 1 inch 9 lines; expanse, 3 inches 10 lines. Length of pupa, 1 inch 4 lines; pupa skin of a pale horn color.

The sexes are nearly alike in size and color, but are of course easily distinguished by the male having the two large, subtrigonal, dark-brown covers to the sound organs on the undersides of junction of thorax and abdomen; while the female wants the sound organs, but has the sides of the 8th joint of the abdomen enlarged and inflected below to cover the ovipositor and saw. The joints and a few stripes on the anterior legs are pale-brownish, and the middle of the thorax between base of legs below brownish black. Some specimens are more tomentose than others, but the hairs rarely form distinct patches on the sides; the sides of the thorax below are covered with pale, close hairs. On the whole the species varies very little in size or color. The sulci on the thorax, and the relative proportions of the cells of the wings, are accurately represented in our figure, and need not be described. The basal areolet of the anterior wings is hyaline. Two or 3 small triangular teeth on outer edge of anterior thighs.

REFERENCE.—Germar in Silbermann's Revue Entom., vol. 2, p. 67.

The Cicadæ, forming the old genus *Cicada* of Linnæus, constitute now the family *Cicadidæ*, to the section *Octicelli* of which (or those having 8 marginal cells to the upper wings) the two kinds figured on our plate belong. They are the largest and most famous of the Homopterous insects, remarkable above all things for the loud song or chirping whir of the males in the heat of the summer. Our *Cicada mœrens*, here figured for the first time, produces an almost deafening sound from the numbers of the individuals in the

hottest days, and the loudness of their noise ; which, beginning with a prolonged high-toned whir like that of a knife-grinder, or the letter R loudly prolonged in a high pitch, continued for a minute or two, breaks into a series of diminuendo "squawks," like that of a frightened duck in a farmyard, loud enough to be heard some hundred yards off, and stunning our ears with the shrilling and squalling. This kept up with "damnable iteration," as Falstaff says, by hundreds of individuals all day long, would tax the patience of a saint, if such existed in Australia. One might almost say with Virgil, "*Et cantu querulæ rumpent arbusta Cicadæ*,"* only to burst the Australian "bush" would be rather too much even for their distracting powers. The oratory of Plato must have been very annoying if as like the utterance of our insect as it was said to have been like that of the Greek *Tettix*, "Ἡδύεπτος Πλατων, καὶ τεττιξιν ισολαλος."

There is certainly no Australian insect so likely to remind the classic scholar of the studies of his youth, or remind the schoolboy of a greater number of passages in the old Greek and Latin poets than our *Cicada*. There is scarcely an allusion in the Greek poets, from Homer to Anacreon and Theocritus, referring to the *Tettix* of their country which could not as well apply to the Victorian *Cicada mœrens ;* some of Anacreon's odd hyperbolical praises in his 43rd Ode being, however, as inapplicable to one as the other. It is very curious to see Virgil's remark, "*Raucis sole sub ardenti resonant arbusta Cicadis*,"† on the Italian *Cicada* holding good for this Australian one, which seems to sing all the louder the more burning the sun's rays. All the classic jokes about the happiness of these boisterous males because their wives are dumb may be applied by Australian ascetics to our insect, as well as a multitude of other references in the poets of antiquity, showing a repetition or "representation" of the structure and habits of the European *Cicada* in its commonest Australian representative which is very remarkable.

The Greeks keeping the *Tettix* in cages for the sake of their song, and praising their musical performances so highly, one might

* Georg. 3, 327. † Buc. 2, 12.

almost think indicated a great falling off in their powers to please in our day. As the Chinese, however, do exactly the same still with their *Cicada*, I fancy (as the *Cicadæ* are too great conservatives to change) that the real fact may be that the ancient Greek taste for music may have resembled the execrable modern Chinese one, which, as I have heard it grandly exemplified in some of their theatres on the goldfields, might be said in its din to be diabolical—if the comparison were not perhaps unfair to the absent.

After the singing has drawn attention to the perfect insect having emerged from the pupa skin, the females may be seen ascending the trees until some dry twig is reached, in which they cut a groove with the saw-like plates forming the jagged edges of the broad spear-head at the posterior end of the long, horny, cylindrical borer at the hinder extremity of the abdomen ; and in each groove they deposit a few eggs. The young, as Réaumur remarked of the European *Cicada*, resemble fleas in size and shape ; they quickly reach the ground, into which they burrow, and whence they may be dug out at the roots of trees any time during the larval and pupa states. The larva is white, and seems to feed on underground roots ; the eyes, 6 legs, and antennæ, agreeing with the pupa, as figured on our plate, which chiefly differs in having the rudimentary wings visible at the sides of the body. The pupæ ultimately come out of the ground, crawl up a few feet on the trunk of the nearest Gum-tree in the night, and then, splitting along the back, the surprisingly larger, winged, perfect insect creeps out, leaving the empty pupa skin clinging to the tree quite perfect, even to the smallest hair or other part, in the position of life. These are what Aristotle called the *Tittigometra*, or mother of the *Cicadæ*, from a recognition of the fact of the perfect, winged, *Cicadæ* (*Tettix* of the Greeks) coming forth from them.

This large species of *Cicada* piercing the young twigs of the Peppermint Gum-tree (*Eucalyptus viminalis*) causes an abundant exudation of sap, which, drying in the hot parched air of the midsummer, leaves the sugary solid remains in a gradually increasing lump, which ultimately falls off, covering the ground with a sort of white sweet manna in little irregular masses. This particular kind of manna is the "Melitose" of chemists ($C^{12}H^{22}O^{11}$),

and contains the peculiar material "Eucalin" ($C^6H^{12}O^6$) (only known in the sap of *Eucalypti*), an unfermentable sugar, with another fermentable sort (perhaps *Dextroglucose*), from which it may be separated by fermenting the Melitose.

Both sexes have short lives in the perfect state, and may be seen lying about the ground under the trees, dead or dying, in abundance after their noisiest few days. Our Nankeen Kestrel and other small hawks devour them on the wing in great numbers in their season, and they are probably very nice, like the Greek ones praised by Aristotle as a *bonne-bouche*. The pupæ, the bachelor males, and the females when full of eggs, are the greatest delicacies for the epicure, according to the Greek authority, but none of my friends have enabled me to say whether in their opinion the Australian species merits the like praise.*

This species has not been figured before, although occurring in abundance everywhere throughout Victoria, and extending to Tasmania on the south, and to New South Wales and Queensland on the north.

It appears in myriads about February and in the beginning of March. At these times the empty pupa cases may be seen sticking on the bark of the Gum-trees, particularly the Peppermint Gum, *Eucalyptus viminalis* (the *E. mannifera* of Cunningham), which the perfect insect chiefly frequents, probably from the remarkable sweetness of the sap.

Explanation of Figures.

Plate 50.—Fig. 1, male, natural size, with the wings expanded. Fig. 1*a*, thorax of same, magnified to twice the natural size, to show the markings and proportions of the three divisions of the thorax seen from above. Fig. 1*b*, one of the antennæ of same, magnified five times the natural size. Fig. 1*c*, underside of same, showing the two large plates of the musical organs characteristic of the males, at junction of thorax and abdomen. Fig. 1*d*, anterior leg of same, twice the natural size, to show the toothing. Fig. 2, female, in resting position of the deflexed wings, natural size. Fig. 2*a*, rostrum on underside of head of same, magnified. Fig. 2*b*, underside of abdomen, to show absence of the drum-plates at the anterior end and the large inflected

* Since the above was in type Prof. Strong drew my attention to a passage referring to the song of the *Cicada* in "The Birds" of Aristophanes, charmingly rendered as follows in Dr. Kennedy's translation:—

"But in flowery meads I dwell,
Lingering oft in leafy dell,
When the inspired Cicala's gladness,
Swelling into sunny madness,
Filleth all the fervid noon
With its shrill and ceaseless tune."

covers for the borer at the posterior end. Fig. 2*c*, posterior end of same, more highly magnified. Fig. 2*d*, side view of borer, drawn out from the two lateral pieces of the sheath, the terminal joint of which is movable to receive the enlarged end of the borer. Fig. 2*e*, front view of borer, to show the two portions which move up and down against each other and dilate at the tip with serrated edges. Fig. 3, pupa case of same, split along the back to allow the winged adult to escape, natural size; with bark, leaf, and unopened flowerbuds of the Manna—or Peppermint Gum (*Eucalyptus viminalis*), which they frequent, showing the short peduncles and 3 flowerbuds, usual in the species, with the characteristic proportions of short pedicels, calyx tubes, and operculum. Fig. 3*a*, antenna of same, to show the difference from that of the adult. Fig. 3*b*, anterior leg, magnified.

Plate 50, Fig. 4.

CYCLOCHILA AUSTRALASIÆ (Donov. sp.).

The Great Green Cicada.

[Genus CYCLOCHILA (Amyot et Serv.). (Sub-kingd. Articulata. Class Insecta. Order Hemiptera. Tribe Homoptera. Sect. Trimera. Fam. Cicadidæ. Sect. Octicella.)

Gen. Char.—Body not hairy. Head large, triangular; front strong, pointed, without longitudinal mesial sulcus. Eyes large, oval, prominent. Prothorax transverse, dilated and rounded on the laterally extended sides. Mesothorax slightly notched behind. Anterior and posterior wings transparent. Tarsi with 3 joints.]

Description.—Head, body above and below, legs and veins of both pairs of wings and basal disc pale-yellowish grass-green, or pale-tawny horn-brown, or various irregular mixtures of these two colors. Eyes yellowish-grey; ocelli amber-red, surrounded by a small black patch; membrane of both pairs of wings clear and unspotted. Length (male) of head and body, 1 inch 9 lines; length of anterior wing, 1 inch 11 lines; expanse from tip to tip, 4 inches 4 lines. Length (female) of head and body, 1 inch 9 lines; length of anterior wing, 2 inches 1 line; expanse, 4 inches 8 lines. Anterior thighs with two long equal conical spines, one near each end, and a third small one in front near joint. Length of pupa, 1 inch 6 lines.

Reference.—*Tettigonia Australasiæ* (Donov.), Ins. N. H. Hem., t. 2, f. 1; = *Cicada olivacea* (Germar), Silb. Rev. ii., 57, 4; = *Cyclochila id.* (Amyot et Serv.), Hist. Nat. Hem., p. 470.

The males and females are much alike in color, but the females are often larger in expanse of wings, and have the head a little more acute than the males. The variation from all grass-green to all pale testaceous tawny-brown is so gradual and irregular when a large series is examined that there cannot be a doubt of both extremes belonging to one species. The great width of the circularly dilated margin of the prothorax between the head and the wings is the main generic peculiarity separating this from the other Cicadæ, with which it agrees in most other points of structure.

This species is much less abundant than the *C. mœrens*, and seems more confined to moist places, such as river banks and deep ravines and gullies. The song begins like the quacking of a duck for some time before breaking into the continuous "whir," and is far louder than that of the *C. mœrens*, becoming perfectly unbearable and deafening where they abound. It seems to frequent the various species of *Acacia* (popularly called Wattles) quite as often or more often than the *Eucalypti*. It appears at about the same time as the *C. mœrens* in the hottest time of the year, but is much less widely distributed. It is not uncommon along the banks of the Yarra, near Melbourne. The pupa resembles that of the *C. mœrens*, but is larger, and the tooth-like spines on the anterior legs are darker, larger, and stronger; and the large basal tooth has a small additional spine near its base.

Explanation of Figures.

Plate 50.—Fig. 4, male, natural size, with wings expanded. Fig. 4*a*, thorax and head of same, magnified, to show circularly dilated thin margin. Fig. 5, female, with the wings deflexed in resting position on the common Wattle (*Acacia decurrens* [var. *mollissima*]), which it frequents. Fig. 6, anterior leg of pupa, magnified, to compare with fig. 3*b* of *C. mœrens*.

Frederick McCoy.

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CONTENTS OF DECADES.

N.B.—The originals of all the Figures are in the National Museum, Melbourne.

DECADE I.

PLATE 1.—The Black Snake (Pseudechys porphyriacus, Shaw sp.).
PLATE 2.—The Copper-head Snake (Hoplocephalus superbus, Günth.).
PLATE 3.—The Tiger Snake (Hoplocephalus curtus, Schl. sp.).
PLATE 4.—The Australian Bream (Chrysophrys Australis, Günth.).
PLATE 5.—The Spiny-sided Butterfly-Gurnard (Lepidotrigla Vanessa, Rich. sp.).
PLATE 6.—The Kumu Gurnard (Trigla Kumu, Lesson and Garn.).
PLATE 7.—The Australian Giant Earth-worm (Megascolides Australis, McCoy).
PLATE 8.—Lewin's Day-moth (Agarista Lewini, Boisd.).
The Loranthus Day-moth (Agarista Casuarinæ, Scott).
The Vine Day-moth (Agarista Glycine, Lewin sp.).
PLATE 9.—Pieris (Thyca) Harpalyce (Don. sp.).
PLATE 10.—Pieris (Thyca) Aganippe (Don. sp.).

DECADE II.

PLATE 11.—The Little Whip Snake (Hoplocephalus flagellum, McCoy). The White-lipped Snake (Hoplocephalus coronoides, Günth.).
PLATE 12.—The Death Adder (Acanthophis Antarctica, Shaw sp.).
PLATE 13.—The Carpet Snake (Morelia variegata, Gray).
PLATE 14.—The Gippsland Perch (Lates colonorum, Günth.).
PLATE 15.—The Murray Lobster (Astacoides serratus, Shaw sp.).
PLATE 16.—The Salmon Arripis (Arripis truttaceus, Cuv. sp.). Adult.
PLATE 17.—Ditto of the younger forms and coloring.
PLATE 18.—The Horse Mackerel (Trachurus trachurus, Lin. sp.).
PLATE 19.—The Small-scaled Rock Cod (Lotella callarias, Günth.).
PLATE 20.—The Australian Rock Cod (Pseudophysis barbatus, Günth.).

DECADE III.

PLATE 21.—The Sea-Leopard Seal (Stenorhynchus leptonyx, de Blainv. sp.).
PLATE 22.—The Yellow-sided Dolphin (Delphinus Novæ Zealandiæ, Quoy and Gaim.).
PLATE 23.—The Common Brown Snake (Diemenia superciliosa, Fisch.).
The Small-scaled Brown Snake (Diemenia microlepidota, McCoy).
The Shield-fronted Brown Snake (Diemenia aspidorhyncha, McCoy).
PLATE 24.—Catenicella margaritacea (Busk).—C. plagiostoma (Busk).—C. ventricosa (Busk).—C. hastata (Busk.)—C. rufa (McG.).—C. cribraria (Busk).—C. alata (Wyv. Thomson).—C. lorica (Busk).—C. formosa (Busk).—C. elegans (Busk).—C. perforata (Busk).—C. Buskii (Wyv. Thomson).—C. Hannafordi (McG.).—C. crystallina (Wyv. Thomson).—C. carinata (Busk).—C. aurita (Busk).—C. geminata (Wyv. Thomson).—C. cornuta (Busk).—C. intermedia (McG.)
PLATE 25.—Membranipora membranacea (Linn. sp.).—M. perforata (McG.).—M. ciliata (McG.).—M. mamillaris (McG.).—M. umbonata (Busk).—M. pilosa (Linn. sp.).—M. cervicornis (Busk).
PLATE 26.—Membranipora dispar (McG.).—M. Woodsii (McG.).—M. lineata (Linn. sp.).—M. Rosselii (Audouin sp.).—M. Lacroixii (Savigny sp.).
PLATE 27.—The Australian Rockling (Genypterus Australis, Cast.).
The Yarra Blackfish (Gadopsis gracilis, McCoy).
PLATE 28.—The Southern Mackerel (Scomber pneumatophorus, De la Roche).
PLATE 29.—The Yabber Crayfish (Astacoides bicarinatus, Gray sp.).
PLATE 30.—The Large Wattle Goat-Moth (Zeuzera Eucalypti, Boisd. Herr.-Schæf.).

DECADE IV.

PLATE 31.—The Australian Sea-Bear or Fur-Seal (Euotaria cinerea, Péron sp.).
PLATE 32.—The Two-hooded Furina-Snake, Furina bicucullata (McCoy).
PLATE 33.—The Banded Red Gurnet-Perch (Sebastes percoides, Solander sp.).
PLATE 34.—The Angel-fish (Rhina squatina, Lin. sp.).
PLATE 35.—Lepralia circinata (McG.).—L. Cecilii (Aud.).—L. diaphana (McG.).—L. marsupium (McG.).—L. subimmersa (McG.).—L. anceps (McG.).—L. Maplestonei (McG.).
PLATE 36.—Lepralia vittata (McG.).—Membranipora perforata. Lepralia Brogniartii (Aud.).—L. elegans (McG.).—L. pertusa (Esper. sp.).—L. Malusii (Aud. sp.).—L. lunata (McG.).
PLATE 37.—Lepralia ciliata (Linn. sp.).—L. trifolium (McG.).—L. cheilodon (McG.).—L. canaliculata (McG.).—L. larvalis (McG.).—L. diadema (McG.).—L. papillifera (McG.).—L. Ellerii (McG.).
PLATE 38.—Lepralia monoceros (Busk).—L. excavata (McG.).—L. vitrea (McG.).—L. megasoma (McG.).—L. Schizostoma (McG.).—L. Botryoides (McG.).—L. ferox (McG.).—L. pellucida (McG.).
PLATE 39.—Crisia Edwardsiana (D'Orb. sp.).—C. biciliata (McG.).—C. acropora (Busk).—C. setosa (McG.).—C. tenuis (McG.).
PLATE 40.—Saunders' Case-Moth (Metura elongata, Saunders sp.).
The Lictor Case-Moth (Entometa ignobilis, Walk.).

DECADE V.

PLATE 41.—The Lace Lizard (Hydrosaurus varius, Shaw sp.).
PLATE 42.—The Spotted Marsh-Frog (Lymnodynastes Tasmaniensis, Günth.).—The Common Sand-Frog (Lymnodynastes dorsalis, Gray).
PLATE 43.—The Carpet Shark (Crossorhinus barbatus, Lin. sp.).—The Seven-gilled Shark (Notidanus [Heptanchus] Indicus, Cuv.).
PLATE 44.—The Barracouta (Thersites atun, Cuv.).—The Tunny (Thynnus Thynnus, Lin. sp.).
PLATE 45.—Flustra denticulata (Busk).—Carbasea episcopalis (Busk).—C. dissimilis (Busk).—C. indivisa (Busk).—C. elegans (Busk).—C. pisciformis (Busk).
PLATE 46.—Spiralaria florea (Busk).—Diachoris Magellanica (Busk).—D. spinigera (P. McGil.).—Dimetopia spicata (Busk).—D. cornuta (Busk).—Didymia simplex (Busk).—Calwellia bicornis (Wyv. Thomson).
PLATE 47.—Dictyopora cellulosa (P. McGil.).
PLATE 48.—Eschara obliqua (P. McGil.).—E. dispar (P. McGil).—E. gracilis (Lamx.).—E. platalea (Busk).—E. quadrata (P. McGil.)—E. mucronata (P. McGil.).—Caleschara denticulata (P. McGil.).
PLATE 49.—Cellaria fistulosa (Linn.).—C. hirsuta (P. McGil.).—C. tenuirostris (Busk.).—C. gracilis (Busk).—Nellia oculata (Busk).—Tubucellaria hirsuta (Busk).
PLATE 50.—The Great Black, or Manna Cicada (Cicada mœrens, Germ.).—The Great Green Cicada (Cyclochila Australasiæ, Donov. sp.).

Natural History of Victoria.

PRODROMUS

OF THE

ZOOLOGY OF VICTORIA;

OR,

FIGURES AND DESCRIPTIONS OF THE LIVING SPECIES OF ALL CLASSES

OF THE

VICTORIAN INDIGENOUS ANIMALS.

DECADE VI.

BY

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M DCCC LXXXI.

PREFACE.

It having been considered desirable to ascertain accurately the natural productions of the Colony of Victoria, and to publish works descriptive of them, on the plan of those issued by the Governments of the different States of America, investigations were undertaken, by order of the Victorian Government, to determine the Geology, Botany, and Zoology of the Colony, to form collections illustrative of each for the public use, and to make the necessary preparations for such systematic publications on the subject as might be useful and interesting to the general public, and contribute to the advancement of science.

As the geological and botanical investigations have already approached completion, and their publication is far advanced, it has been decided to now commence the publication of the third branch completing the subject, namely, that of the Zoology or indigenous members of the different classes of the animal kingdom.

As the Fauna is not so well known as the Flora, it was a necessary preliminary to the publication to have a large number of drawings made, as opportunity arose, from the living or fresh examples of many species of reptiles, fish, and the lower animals, which lose their natural appearance shortly after death, and the true characters of many of which were consequently as yet unknown, as they had only been described from preserved specimens. A Prodromus, or preliminary issue, in the form of Decades, or numbers of ten plates, each with its complete descriptive letterpress, will be published, of such illustrations as are ready, without systematic order or waiting

for the completion of any one branch. The many good observers in the country will thus have the means of accurately identifying various natural objects, their observations on which, if recorded and sent to the National Museum, where the originals of all the figures and descriptions are preserved, will be duly acknowledged, and will materially help in the preparation of the final systematic volume to be published for each class when it approaches completion.

This sixth Decade gives figures and descriptions in the first plate of a new species of one of those curious Lizards which deceive the popular judgment by assuming the form of Snakes so nearly as to be often mistaken for them.

The second plate figures another of our rarer poisonous Snakes, too small to be dangerous to man, but of a most striking style of coloring disposed in black and white rings, quite unlike any other Australian land Snake, but like some of the Sea-Snakes in this respect, and in this and other characters reminding us of some types peculiar to South America.

The third plate shows the characters of our beautiful green and gold Frog, with the various stages of its metamorphosis from the Tadpole aquatic state, by gradually acquiring legs and losing its tail, to the tail-less terrestrial air-breathing form, with four powerful limbs.

The fourth and fifth plates show the characters of the dissimilar male and female of one of the most gorgeously colored Fishes of our seas, the *Aulopus*, especially remarkable for showing the small ray-less adipose dorsal fin near the tail, considered until lately to characterise the *Salmonidæ*, all of which, whether Trout or Salmon, possess it.

The sixth plate gives evidence of the identity of Victorian specimens of that extraordinary Fish, the Hammer-headed Shark, with the European type; and figures for the first time another anomalous Shark, our common Saw-Fish (*Pristiophorus*).

The four following plates continue the illustrations of our wonderfully rich Polyzoan Fauna contributed by Dr. MacGillivray to the National Museum and this work, in which many of them are figured for the first time.

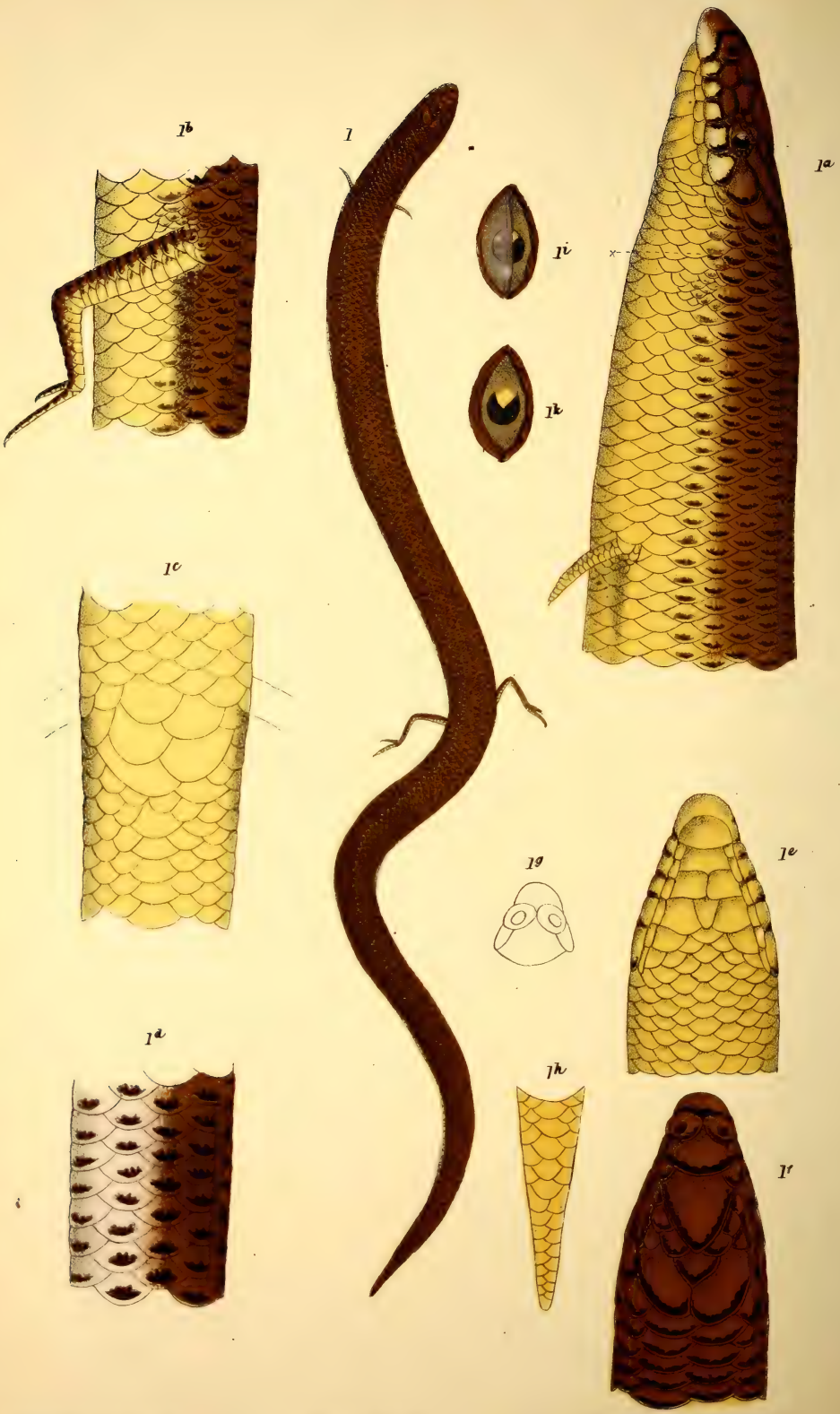
The succeeding Decades will illustrate as many different genera as possible, and will deal first usually with species of some special interest, and of which good figures do not exist, or are not easily accessible.

FREDERICK McCOY.

25th August 1881.

ZOOLOGY OF VICTORIA

(Reptiles)



A. Bartholomew del. et lith. *Prof. M^c Coy dir exit.* *Steam litho, Govt, Printing Office*

PLATE 51.

RHODONA OFFICERI (McCOY).

THE VICTORIAN RHODONA.

[Genus RHODONA (GRAY) = BRACHYSTOPUS (DUM. & BIB.) = RONIA (GRAY). (Sub-kingd. Vertebrata. Class Reptilia. Order Sauria. Sub-ord. Leptoglossæ. Tribe Geissosaura. Fam. Scincidæ.)

Gen. Char.—Body and tail cylindrical, elongate; tail conical, pointed, with 3 or 5 rows of large scales on under side. Legs 4, rudimentary, far apart; anterior ones very small, tapering to a point, simple, not divided into toes; hind pair larger, divided into two cylindrical toes with claws, the outer toe about twice the length of the inner one. Head semiconical, depressed, convex above, subcuneiform at tip; rostral plate depressed, sharp-edged, very wide, triangular, rounded in front; 2 fronto-parietal plates; nasal plates large, triangular, converging in front, each with the superior lateral nostril in the middle; no supra-nasals. Tongue flat, granular, notched at tip; palate with a short posterior groove, and no teeth; teeth on jaws conic, blunt; ear a minute, depressed point; eyes small, lower eyelid transparent; surface of body smooth, glossy. Scales smooth, not keeled. (Dr. Günther describes *R. fragilis*, from Peak Downs, as having the anterior as well as posterior legs with three fingers each, in the Journal des Museum, Godeffroy Heft., xii., p. 45; and he describes *R. Gerrardi* as having 1 toe on one side and 2 on the other of the anterior limb.)]

DESCRIPTION.—Head obtusely pointed in front, moderately depressed, a little wider behind than the neck, from which the body tapers gradually to tip of tail; back and belly of body slightly flattened, tail circular in section. *Plates:* 6 labials, the fourth forming lower edge of orbit, the upper two-thirds of orbit bordered by 1 to 3 rows of small scaly plates; rostral large, pentagonal, obtuse-angled above; nasals large, joining with only small suture; 1 loreal and 2 anterior ocular small plates between eye and nasal; fronto-nasal, or prefrontal, transverse, nearly twice as wide as long, rounded behind, length equalling frontal and suture of contact of nasals; next central plate, or frontal, subpentagonal or nearly triangular, length equalling from tip of snout to its front edge; next median plate, or occipital, small, subrhombic, slightly less than half the length of the preceding frontal; 3 smaller plates extend on each side from it to the superior ocular; a large parietal plate on each side about equalling the frontal and half of the prefrontal in length. *Scales:* about 18 rows round middle of body, those of belly smaller than back; 26 from gape of mouth to to base of front leg; from thence to base of hind leg, 87; middle row under tail rather larger than those of sides or back of tail; 2 large pre-anal scales. Anterior limb as long as four and a half of the adjacent scales, about half the length of the gape, ending in a small conical point, and lodged in a channel. Hind limb with two toes, the outer rather more than twice the length of inner one, each with a minute conical claw. Ear-opening a very small depressed pore surrounded by a patch of smaller scales on each side. *Color:* head above the labials and dorsal half of body rich hazel-brown; labial plates, throat, and lower half of sides and belly very pale yellow-ochre; lower half of tail very pale lilac, irregularly flecked with dark-brown, and a slight tinge of the same on dorsal half, rendering the tail darker than the body; 8 to 10 longitudinal rows of black spots, produced by a corresponding number of the transverse rows of scales above, having each an irregular, vertical, lunate, jagged blotch of black a little behind its middle, those of tail larger than on body. The labials and plates of head each with a brown blotch near posterior

edge; anterior limb all yellowish, posterior limb yellowish below, closely freckled with brown above. Total length, 7¾ inches, of which the tail is one-half. Length of gape, 4 lines; greatest width of head, 3½ lines; length of anterior limb, 2 lines, of posterior limb, 6 lines.

This is one of several most interesting little Lizards resembling Snakes so completely in external appearance as to deceive the popular observers, who frequently send me the more common kinds with the enquiry as to whether they are poisonous Snakes or not. Like even the most snake-like Lizards the jaws in this are not dilatable as those of all Snakes are, and it has distinct, though very small, external ears, looking like impressed pores, which no Snakes have. No Snakes have movable eyelids, while they are not only present in this little creature, but exhibit a curious provision for preventing the sand, into which it likes to burrow, from damaging the eye, and at the same time allows sufficient vision, owing to the perfect transparency of the middle of the eyelid. When the fierce north wind raises the clouds of summer dust into a "brickfielder," we might feel inclined to envy the *Rhodona* and wish we could shut our eyes and have a transparent spot in the lid to look through with impunity.

The limbs lodge in hollows so as not to project beyond the surface when retracted, thus offering no resistance while burrowing.

The specimen figured, which is the only one seen as yet, was given to me alive by Mr. Charles Officer, M.P., and was kept in a bottle of sand for some weeks. If brought to the surface, it arched the anterior part of the body, and, plunging the narrow wedge-shaped front of snout into the sand, quickly burrowed out of sight; the highly polished surface of the scaled body, as smooth as glass, obviously suiting this habit to perfection. I could not induce it to feed in confinement, nor would it eat flies for Mr. Officer, who kept it a week or two before I saw it; but perhaps, like its near ally, the English Slow-worm, or Blind-worm (*Anguis fragilis*), it may eat slugs and worms when at liberty.

In the proportional length of the anterior limb this new species is intermediate between *R. punctata* (Gray)* = *Ronia catenulata*

* An. Nat. Hist., ii., 335.

(Gray),* and the *R. Gerrardi* (Günth.)† of Swan River, the *R. punctata* having it as long only as one scale of the sides of the body, *R. Gerrardi* has it as long as six scales, while in the present one it is equal to four and a half of the adjoining scales.

Locality : rare in the loose sandy soil of the plains on the banks of the Murray. The type specimen was found about one mile from the river and two miles from Swan Hill.

Explanation of Figures.

Plate 51.—Fig. 1, dorsal view, natural size. Fig. 1*a*, side view, enlarged four diameters, of anterior portion of body, to show the disposition of the colors, the relative positions of nostril, eye, and ear (the place of the latter marked by a dotted line), and the form, relative size, and scaling of the simple anterior limb. Fig. 1*b*, hind limb and part of body, magnified four diameters. Fig. 1*c*, anal and subcaudal scales, with place of base of hind limbs, magnified four diameters. Fig. 1*d*, side view of middle of tail to show color and markings. Fig. 1*e*, under view of head, magnified four times. Fig. 1*f*, upper view of head, magnified four times. Fig. 1*g*, rostral, nasal, and following plate, magnified four times. Fig. 1*h*, under side of tail, magnified four diameters. Fig. 1*i*, eye, showing the transparent lid half closed, magnified. Fig. 1*k*, eye, with eyelid open, magnified.

Frederick McCoy.

* Grey, Journal of Two Expeditions of Discovery in Australia, v. 2, p. 487.

† An. Nat. Hist. v. 20 July 1867, p. 46.

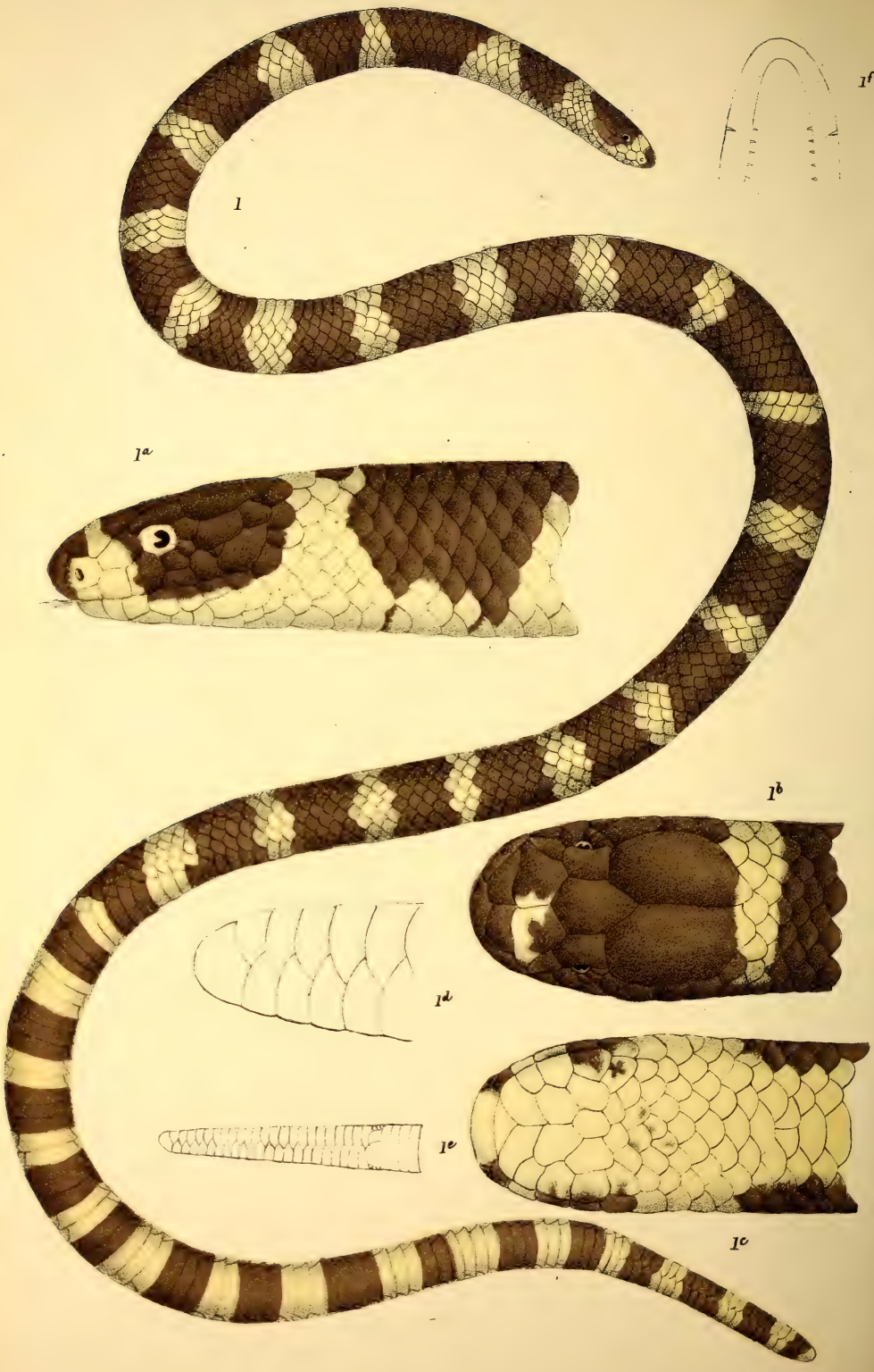

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PLATE 52.

VERMICELLA ANNULATA (GRAY).

THE BLACK AND WHITE RINGED SNAKE.

[Genus VERMICELLA (GRAY). (Sub-kingd. Vertebrata. Class Reptilia. Order Ophidia. Fam. Elapsidæ.)

Gen. Char.—Body elongate, cylindrical; head thick, blunt, rounded, little wider than the neck; rostral plate moderate, rounded; nasal large, with the small nostril pierced near the middle; one large anterior ocular plate, and two small posterior ocular plates. Scales subequal (vertebral line not larger than the others), smooth, imbricated, about fifteen rows; anal and sub-caudal plates in two rows. Tail very small, conical. One minute, grooved fang, and no other teeth in jaw. Australia.]

DESCRIPTION.—*Form:* body long, slender, cylindrical; tail slender, conical, ending in an obtuse conical point, covered by a polished conical scale; head no wider than the neck, only slightly flattened, obtusely rounded in front. *Scales:* moderate, rhombic, smooth, 15 rows across middle of body; abdominal plates moderately wide, varying from 212 to 229; subcaudal plates varying from 24 to 19 pairs. *Plates:* rostral shield large, obtusely rounded, obtuse angled or rounded behind, nasal plate large, touching the posterior frontal, anterior ocular large, a little shorter than the nasal; 2 posterior oculars, small, scarcely equalling the diameter of the eye in length; anterior frontals small, twice as wide as long; posterior frontals about twice as long as anterior one, a little wider than long; vertex plate, subpentagonal, subtruncate and broadest in front, about one-third longer than wide, occipitals rather narrow, subtrigonal; six upper labials, the 2nd, 3rd, and 4th labials touch the eye; anterior temporal large, two posterior temporals together shorter than anterior, in contact with the upper or lower posterior ocular. *Color:* yellowish white, with about 32 to 42 transverse brownish-black rings, about six scales wide on back, separated by white intervals about 3 scales wide, more nearly equal below, where each color occupies about 3 or 4 scales wide; throat white; rostral and anterior frontal plates and anterior half of nasal plate black; labial plates, anterior ocular, and posterior frontals white; superciliary, vertex, and occipital plates black. *Teeth:* one small poison fang on each side, no other teeth in jaws, two rows of about 5 small teeth on palate. Length usually about 2 feet, of which the tail is 1 inch 5 lines, cleft of mouth 6 lines, greatest width of body, 6 lines.

REFERENCE.—Snake No. 2. White Journal. New South Wales, Ap. p. 259. Günther, Cat. Col. Sn. B. M., p. 236.

This is one of the rarer Snakes of Victoria, and does not occur much further south than Sandhurst. It is impossible to confound it with any other land Snake from its striking colors arranged in numerous, nearly regular, alternate black and white bands. These colors are nearly pure when the skin has been newly changed, but

the white gets a slight yellow tinge, and the black a brown coat, when the skin is old ; the pattern varies a little on the head, and the figured specimen differs from all the others in having the black bands wide and including a white patch, below. The curious peculiar character of having no teeth behind the fang in the upper jaw is quite clear in all the specimens examined. The size of the ocular plates varies in the different specimens ; and in the one figured the fourth labial plate is divided so as to give an erroneous appearance of a third posterior ocular, which does not exist in the other specimens.

The following table gives the number of scales and measurements of four of the specimens in the National Museum collection :—

Specimens.	Scales of Back.		Lower Plates.		Length.		Color Rings.
	Across middle.	Over base of Tail.	Abdomen.	Tail (pairs).	Total.	Tail.	
					ins. lines.	ins. lines.	
Figured specimen	15	14	223	23	20 0	1 3	35
2nd, from Lake Cooper ...	15	15	229	19	25 0	1 5	42
3rd, „ „ ...	15	15	217	24	19 0	1 5	40
4th	15	15	212	24	16 6	1 3	32

EXPLANATION OF FIGURES.

PLATE 52.—Fig. 1, average specimen, natural size. Fig. 1*a*, profile of head, enlarged three diameters. Fig. 1*b*, top view of head, magnified three times to show the form and disposition of the plates. Fig. 1*c*, lower side of head, magnified three diameters. Fig. 1*d*, under side of tip of tail, magnified four diameters. Fig. 1*e*, under side of tail, showing the two rows of sub-caudal plates and a few of the abdominal plates ; natural size. Fig. 1*f*, interior of mouth, magnified to show the two fangs and two rows of palatine teeth.

FREDERICK McCOY.

(Batrachia.)

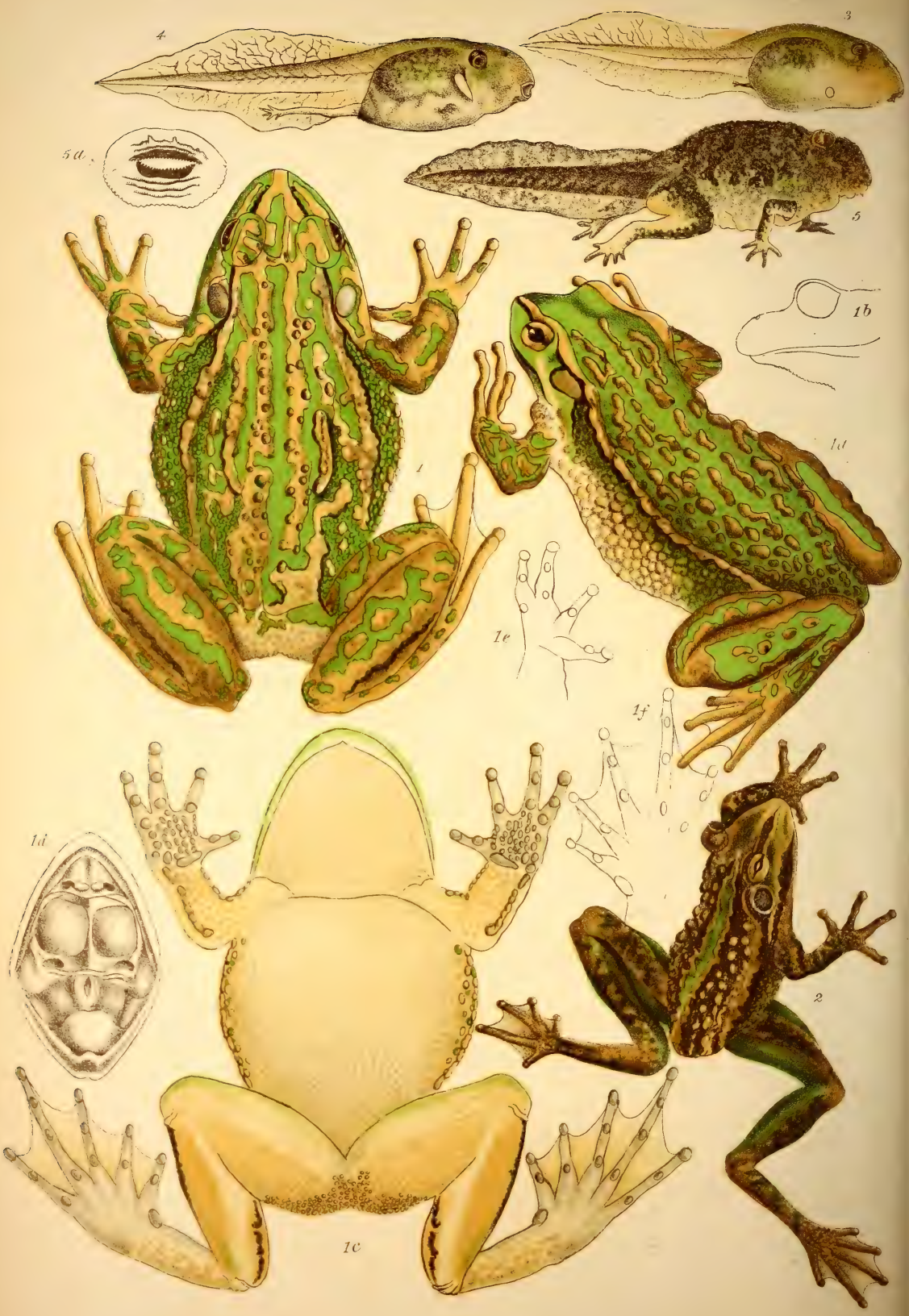

PLATE 53.

RANOIDEA AUREA (LESS. SP.).

THE GREEN AND GOLDEN BELL-FROG.

[Genus RANOIDEA (TSCHUDI). (Sub-kingd. Vertebrata. Class Reptilia. Order Batrachia. Sub-ord. Anoura. Section Opisthoglossa. Fam. Hylidæ.)

Gen. Char.—Vomerine teeth forming two small groups between the inner nostrils. Tongue rounded, about one-third or less of its length free, very slightly notched behind. Ear-drum large, distinct. Eustachian tubes large; fingers and toes depressed, each terminated by a small oval disc, toes webbed, fingers not webbed. A subgular vocal sac in the male. Abdomen and under side of thighs glandulous; ends of transverse processes of sacral vertebræ not dilated. Australia.]

DESCRIPTION.—*Form:* body broad, ovate, depressed; head semielliptical, longer than broad, flattened above in front, concave between the very prominent eyes, which are less than the diameter of orbits apart; nostrils small, a little nearer the front edge of snout than edge of eye; ear-drum large, oval, nearly as long as the diameter of iris; about one-fifth of the length of the tongue free, very slightly notched behind. Legs stout, well developed; fingers with a slight membranous border, depressed, free from web; terminal discs small, suboval; a conspicuous glandular tubercle under each joint; 3rd finger longest, inner one shortest, swollen, and with a large transverse soft tubercle at base, palm of the hand crowded with coarse glandular tubercles; soles of hind feet smooth, toes slender, with small terminal discs, smaller than those of the fingers, and a smaller tubercle under each joint, a larger oblique tubercle at base of inner toe; webs extending to the terminal tubercles of all the toes except the 4th or longest one, which is only webbed to the penultimate joint; a narrow membranous ridge extends along the inner lower edge of the tarsus; sides, abdomen, under side of arms, tarsus, and hinder part of thighs on under side closely covered with small, crowded, glandular tubercles; front of head, cheeks, and midline of back smooth, about 4 irregular lines of large tubercles on each side of back, varying in size, shape, and disposition; a thick, tubercular, glandular ridge of a yellow color along each side of the body, extending from the middle of the snout over each eye and ear-drum, converging again at posterior end of body; smaller one from angle of mouth to shoulder. There are about 30 minute teeth in a single row on each side of upper jaw, and about 6 vomerine teeth in a little transverse group on each side, very slightly separated in the middle, and extending close to inner edge of the internal nostrils. *Color:* usually a brilliant verdigris- or pea-green above, and pearly-, purplish-, or brownish-white below; the soles of the feet and palms of the hands purplish-grey; hinder part of thighs and hind legs rusty-orange, with lighter glandular granules; a black streak extends from the nostril to the eye, and extending from behind the eye over the ear-drum, a variable way down the side, under the glandular yellow lateral streak, sending off a branch towards back of shoulder; above this constant black streak is an equally constant yellow one, the two lateral ones beginning at one point near middle of front edge of snout, diverging thence over the eye and extending along the sides of back, with thickened prominences, converging towards hind end of body; a similar yellow streak extends to angle of mouth, along upper lip, from about the vertical of the nostril; besides this lateral

streak the rows of tubercles on the back are sometimes dark and sometimes golden-yellow (often with metallic golden-bronze lustre); the arms and legs mottled with irregular bands and patches of bluish-green and rusty-yellow. Hind part of the thighs and legs of a more bluish-green than the other parts of the body. Iris golden-bronze, with a black longitudinal streak on each side of the pupil; hands, feet, toes, and webs brownish golden-yellow.

Measurements of average specimen:—Length of head, 1 inch; greatest width, 1 inch 3 lines; depth, 7 lines; total length from tip of snout to posterior end of body, 3 inches 3 lines; greatest width of middle, 1 inch 8 lines; depth, 1 inch at middle; length, 1 inch 5 lines; leg, from knee to ankle, 1 inch 5 lines; from ankle to tip of longest or 4th toe, 2 inches 2 lines; length of inner or shortest toe, 5 lines; 2nd, 8 lines; 3rd, 1 inch; 4th, 1 inch 4 lines; 5th, 1 inch; length of arm from shoulder to elbow, 8 lines; from elbow to tip of 3rd or longest finger, 1 inch 5 lines; length of ear-drum, 3 lines; diameter of eye, $3\frac{1}{2}$ lines.

Reference.— = *Rana aurea* (Less.), Voy. Coq. Zool., t. 7, f. 2 (1830); =*Ranoidea Jacksoniensis*, Tschudi, Mém. Soc. Sc. Nat. N., v. 2 (1838);=*Hyla Jacksoniensis*, Dum. & Bib. Erpt. gén., v. 8, p. 602 (1841).

This is one of the most beautifully colored Frogs known, but varies greatly; in early summer it is usually of the richest verdigris-, or pea-, green, with the rows of tubercles and spots and streaks of rich yellow, shining with bright golden-bronze metallic lustre in various parts. Other specimens agree with the above, but have a variable number of spots and streaks of dark-purple on the green of the back and sides; while some few are dark-brown or almost black on the head, back, and sides, where the green color is usually seen; and these often have the spots and streaks with a strong metallic lustre of golden-bronze, the green only seen on the thighs and legs, where it has a bluer hue than on other parts of the body. These extremes of bright-green and blackish-brown change one into the other at different times in one individual. For instance, the brown specimen, fig. 2 on our plate, turned green before the drawing was quite finished; and the beautiful green specimen, fig. 1*a*, escaped after the drawing was colored, and could not be found for some days, when, finding something soft under my foot, I picked up what I thought was an old brown kid glove, and found it was my sitter for the portrait, and put him again into his glass, where he died next day, first changing into his former vivid pea-green. In spring they are often entirely blackish above and white below, with bluish-green only on the thighs; and a specimen, entirely green above (tubercles and all), turned in a day to the uniform dark color above.

So completely like the common green edible Frog of Europe (*Rana viridis*) is this in form and habits, that I cannot agree with the majority of modern writers, who refer it to the genus *Hyla*, and I willingly adopt rather for it the genus *Ranoidea* of Tschudi, leaving it in the family *Hylidæ*. The discs at the tips of the fingers and toes are so much smaller than in *Hyla*, or the true Tree-Frogs, that they are almost useless for climbing, although they adhere tenaciously to the fingers when the living creature is held ; and this species, unlike the Tree-Frogs, is not found on trees or bushes, but in the neighborhood of water, ponds or pools of any kind, into which they, like the true Frogs (*Rana*), plunge on the least alarm, instead of shunning it as the Tree-Frogs (*Hyla*) do. The note of the male also approaches that of various true Frogs (*Rana*), and is quite unlike that of the Tree-Frogs (*Hyla*). The general sound is a hoarse, prolonged croak, varied by a loud "clunk" monotonously repeated at intervals, very much like the sound of the mallet and chisel of a number of stonemasons. So like is this that when a portion of the University was being built, and a number of masons were working on the hard sonorous basalt (called bluestone by the colonists) a hundred yards from my house, a newly arrived servant, writing home an account of the busy scene, mentioned that the masons could be heard at work the whole of the moonlight nights—so completely alike was the sound of these Bell-Frogs in an adjoining pond at night to the noise of the men by day. In summer the note often resembles so exactly the short "clunk" of the cattle-bells, that people seeking their cows or horses at dusk in the bush can scarcely tell one from the other.

The transverse processes of the sacral vertebræ are, as a rule, dilated at their ends in the *Hylæ*, but in the present Frog they are as narrow and nearly cylindrical as in the true Frogs (*Rana*); and it is curious that Dr. Günther, in describing the skeleton, does not notice this point. They keep on the margins of pools or under water during the day, but at night they wander about anywhere over the ground and gardens, seeking slugs, insects, worms, &c., for food. They are eaten by the natives, who, taking a torch by night, thrust a sharpened stick through as many of them as they choose to make a meal of, and using it like a spit, roast

the collection to their taste ; and no doubt they are as good as the epicures in France find the *Rana viridis.*

A Greek scholar who had enjoyed at home the "ΒΑΤΡΑΧΟΙ" of Aristophanes, and noted the ludicrous exactness with which the author imitates the sound of the European Frogs' chorus in a marsh by his opening words of the chorus—

"βρεκεκεκὲξ κοὰξ κοάξ
βρεκεκεκὲξ κοὰξ κοάξ"

would fancy the Frogs of Greece had come out to bear him company, so accurately does the sound of the daily summer chorus of the present species in the like situation accord with that of the true *Rana* of Europe. The Australian youth, who might fancy that the coincidence was not so exact, from detecting a difference between the sound of the words as uttered in the schools and by the Frogs in the neighboring water, will find the discrepancy disappear, and at the same time the similarity of the European true Frogs and our representative, in this respect, vindicated by the following observation of Frere, in his translation of this play.* He begins the chorus with "*Brekeke-kesh*, *koash*, *koash*," and says in a preliminary note, "The spelling of the words of the chorus is accommodated to the actual pronunciation of the Frogs, which, it is presumed, has remained unaltered. The *B* in *Brekeke-kesh* is very soft, and assimilates to the *v*. The *e* in *kesh* is pronounced like ei in leisure, and the last syllable prolonged and accented with a higher tone. The word as commonly pronounced by scholars (with the ictus or English accent on the third syllable) bears no resemblance to the sound which it is meant to imitate ; which has, on the contrary, a slight ictus on the first syllable." This *V* sound of the *B*, or *β*, makes the wording of Aristophanes as exact an imitation of our present Frog as Frere makes it for the Greek one. I have been much amused in listening to the "Frösche Cantata" of the German composer Hennig, which is sometimes capitally sung by our Melbourne Liedertafel, in which the bass voice takes the part of a mature German Frog, giving the occasional loud croak of our species with all the additional exactness which a careful composer's music could

* The Works of the Right Honorable John Hookham Frere, edited by W. E. Frere, vol. 3, p. 249.

add to the imitation. I fancy that difference of age of the individuals may account for some of the difference of the notes, and that not only the occasional very loud croak but also the metallic "bell" sound may only be uttered by old males.

This species occurs in abundance over the whole colony, wherever stagnant water is to be found. It has not been figured of the correct colors of life before.

Explanation of Figures.

Plate 53.—Fig. 1, ordinary green specimen, viewed from above, natural size. Fig. 1*a*, one with fewer dorsal yellow tubercles viewed sideways (toes shortened by perspective). Fig. 1*b*, outline profile of head. Fig. 1*c*, same specimen as fig. 1, viewed from below. Fig. 1*d*, inside of mouth, showing two groups of vomerine teeth between the inner nostrils, also the Eustachian tubes and slightly notched tongue, natural size. Fig. 1*e*, underside of hand showing discs of fingers and swollen base of thumb, natural size. Fig. 1*f*, underside of foot, showing webs and discs of toes, natural size. Fig. 2, brown emaciated smaller specimen, natural size. Fig. 3, early stage of tadpole state, with gill opening, no front legs, and only slight trace of hind pair of legs, natural size. Fig. 4, more advanced stage of tadpole growth, with the hind limbs more developed, but still useless and not free, the anterior limbs not yet begun, natural size. Fig. 5, much more developed stage, with all four limbs well developed and capable of supporting the body, the tail beginning to shrivel, and the gill-openings closed as breathing by the lungs has commenced, natural size. Fig. 5*a*, front view of mouth of last specimen, natural size.

Frederick McCoy.

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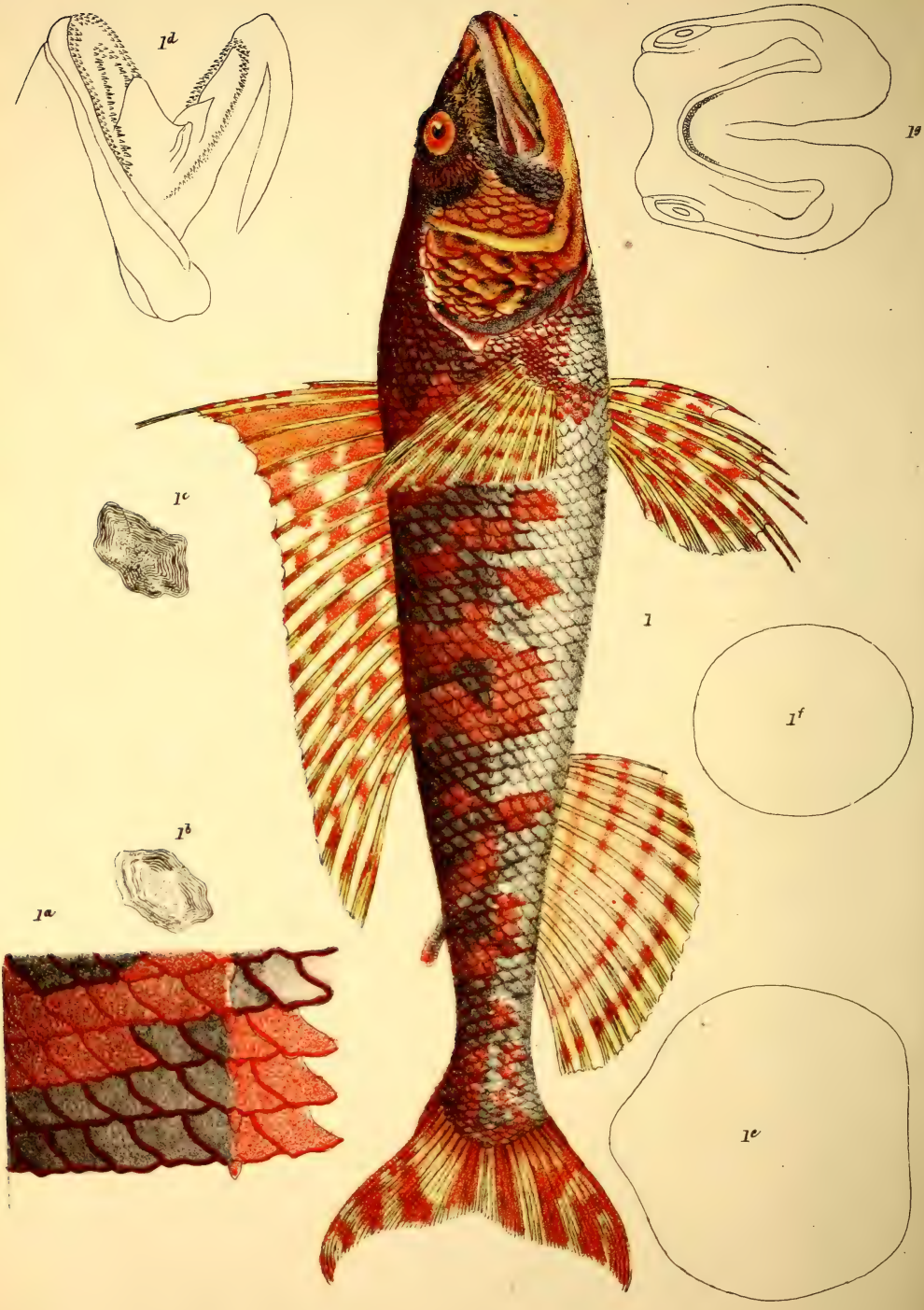
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Plates 54 and 55.

AULOPUS PURPURISATUS (Rich.).

The Australian Aulopus.

[Genus AULOPUS (Cuv.). (Sub-kingd. Vertebrata. Class Pisces. Sub-class Teleostei. Order Physostomi. Fam. Scopelidæ.)

Gen. Char.—Head and body moderately elongate, fusiform, slightly compressed; scales of moderate size; mouth deeply cleft, composed of the intermaxillaries; the maxillaries widely dilated behind; teeth small, in cardiform bands on the jaws, vomer, pharyngeal and pterygoid bones and tongue; eyes moderate; pectoral fins moderate; ventrals large (nine rays) just behind the pectorals, under the anterior dorsal ray; dorsal fin long, of fifteen or more rays, on middle of back; a small adipose dorsal fin between the dorsal and caudal; anal moderate; caudal forked: gill-opening very wide, branchiostegals numerous; pseudo-branchiæ well developed. Pyloric appendages few. Air bladder none.]

Description.—Female. *Form:* elongate, fusiform; depth of body in front of dorsal fin one-fifth the total length, excluding caudal fin; head about one-fourth of total length to tip of caudal, tetragonal, deeply hollowed between the eyes, rugose and slightly spinulose, cheeks nearly vertical, depressed towards snout, lower jaw a little longer than upper one; eye nearly seven times in length of head, and two and a half diameters from tip of snout. *Scales:* rounded, not ciliated, those on cheeks about as large as on anterior part of body, those on operculum much larger; about 55 (54 to 56) along lateral line, 5 to 7 above and 8 to 11 below under front of dorsal. *Fins:* dorsal rays, 20 or 21, first or simple spinous one, about two-thirds the length of ninth, which is shortest, the other rays branched and slightly increasing in length towards posterior end, where they exceed the interval to the adipose fin; caudal slightly forked, of about 20 rays, and a few short ones above and below; anal large, of 14 rays, the first ray simple and shortest; ventral large, of 9 rays, first four rays very thick, the first simple, the next three bifid and longest; the rest shorter and much branched; pectoral moderate, pointed, of 11 rays. *Color:* head and back purple, with the edge of the scales and a few spots on top of head vermilion, with a tinge of carmine, with several large irregular spots and transverse bands, two or three scales wide, of the same scarlet carmine red, with darker edges to the scales; the red patches do not reach the midline of the abdomen; below the lateral line the purple becomes lighter to pearly white on belly; ventral, dorsal, pectoral, and caudal fins yellowish, with transverse bands of crimson-red blotches; scaly adipose fin, purple below, yellow in middle, and red at tip; anal white with orange bands. *Teeth:* 3 rows in front and 2 behind on jaws; 2 rows of about 20 on palate bones; 6 or 8 on vomer, and a small patch on tongue. Branchiostegal rays, 14.

Reference.—Richardson, Icones Piscium, p. 6, t. 2, f. 3. = *A. Milesi,* Cuv. and Val., Hist. des Poiss., v. 22, p. 519, t. 650.

This magnificently colored Fish belongs to the restricted genus *Aulopus*, founded by Cuvier for a Mediterranean species, supposed to be a kind of Salmon by Bloch, who referred it to the genus *Salmo*, from its possessing the small adipose dorsal fin of all the

Salmonidæ. In Sydney it is popularly called the "Sergeant Baker." The males have much more elongate anterior rays to the dorsal fin and have much duller colors in less distinct patches, the top of the head brownish and rich dark-purple, fading gradually to whitish on belly ; cheeks, operculum, and some round spots on top of head vermilion and carmine, and indistinct rosy blotches on sides ; caudal purple, with 3 rows of reddish blotches ; pectoral dark-grey with 3 or 4 transverse bands of darker spots ; ventrals purplish with 3 rows in front and 5 rows behind of darker purple and lighter spots on the rays ; anal light-grey, with 5 or 6 rows of lighter oblong spots in front, becoming darker purple behind ; front of dorsal orange, hind part of dorsal grey with numerous darker blotches on the membranes of purple, front rays of dorsal red.

The hollowed top of the head and the character of the rays of the ventral fin, as well as the coloring, resembles the *Scorpænæ*, in which such simple large unarticulated rays occur in the pectoral. The extraordinarily large number of the branchiostegal rays separates it from the other families completely.

The first ray of the dorsal in both sexes is spinous, simple and shortest. The second ray bifid and longest, but only slightly exceeding the third and fourth much-branched rays in the female ; while in the male the anterior filament is prolongued to a length about equalling the distance from its base to the adipose dorsal, while the posterior filament ends at little more than half its length ; the first filament or branch of the third ray is rather less than half the length of the second ray.

The following are the detailed measurements of two of the specimens in the Museum :—

Measurements.	Male.	Female.
	ins. lines.	ins. lines.
Length from snout to distal end of middle of caudal	21 3	18 0
„ of caudal to middle	1 3	1 1
„ of caudal to end of lobes	2 11?	3 2
„ from snout to anterior edge of orbit	1 7	1 5
„ of orbit	0 10	0 10
„ of head from snout to end of operculum	5 1	5 0
„ from snout to anal (measured along ventral edge)	13 0	11 9
„ from front of anal to end of middle of caudal	8 3	6 6
„ from snout to base of pectoral	5 6	5 0
„ from snout to origin of 1st dorsal	6 9	6 0

Measurements—*continued.*

Measurements.	Male.	Female.
	ins. lines.	ins. lines.
Length from snout to origin of small scaly 2nd adipose dorsal	16 0	14 0
„ from snout to origin of ventral fin	6 3	6 0
„ of 1st dorsal	6 0	5 7
„ of pectoral	3 1	2 6
Height of (simple) ray of 1st dorsal	1 3	1 3
„ of 2nd (bifid) ray of 1st dorsal	*9 0	2 5
„ of 10th ray	2 1	1 9
„ of penultimate ray	3 4	2 3
„ of adipose dorsal	0 7	0 6
Length of anal	3 0	2 5
Depth of anal (1st ray, simple)	1 7	1 4
Depth of anal (middle rays)	2 4	1 4
Length from base to tip of ventral fin (4th ray)	4 0	3 9
Width between eyes	1 1½	0 11½
Depth of body in front of ventral, about	3 10	3 6
Thickness of body in front of dorsal, about	3 10	3 3
Length of largest intermaxillary teeth	0 1	0 1
Scales 3 to 4 in 1 inch about middle of body at lateral line	...	...

* Tip imperfect.

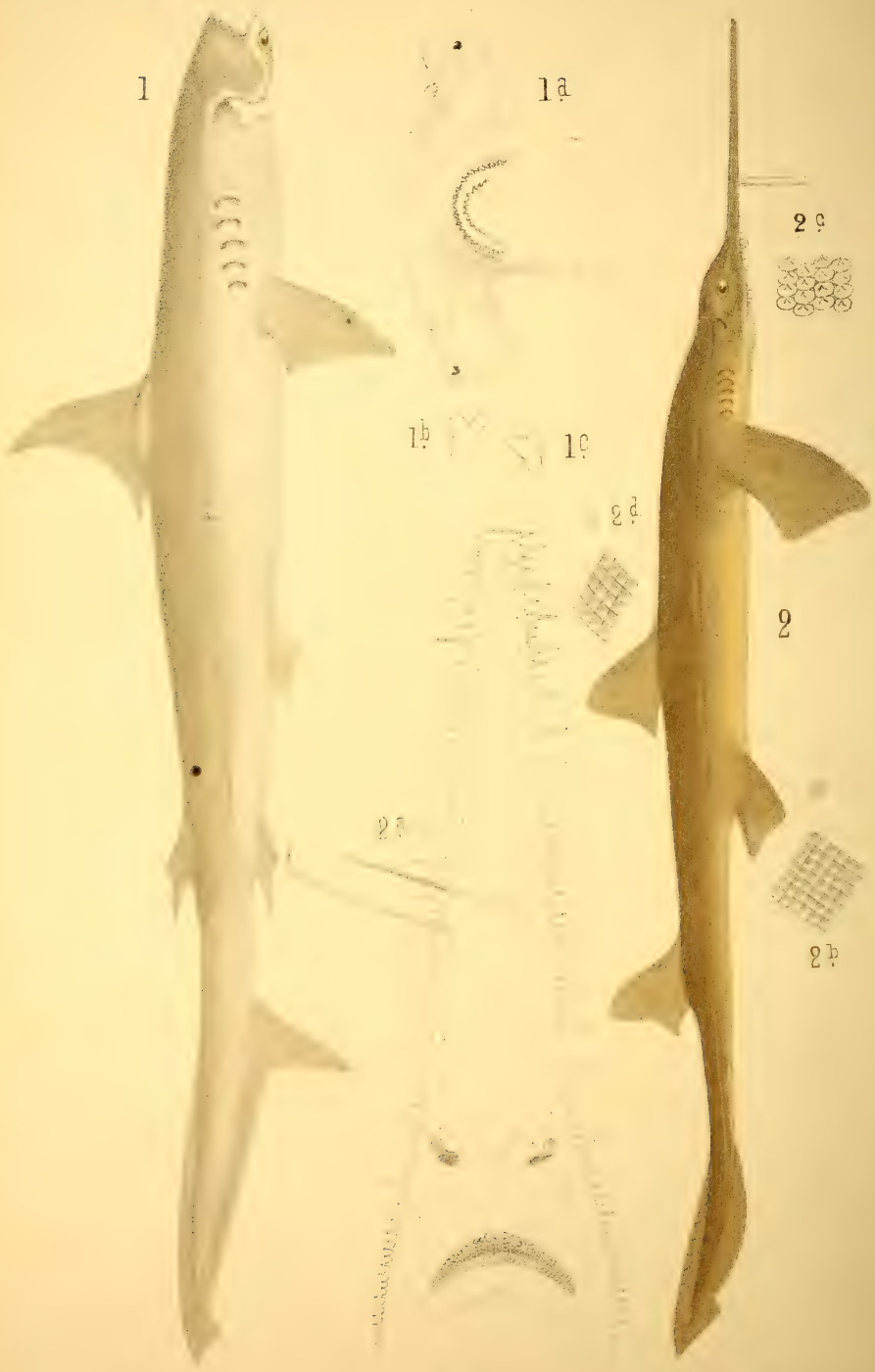
Rare in Hobson's Bay. The specimens in the Museum were caught in January, February, and June.

Explanation of Figures.

Plate 54.—Fig. 1, male, one-third natural size. Fig. 1*a*, teeth on upper and lower jaws, palate bones, vomer, and tongue, natural size. Fig. 2, top of head of another specimen, to show the spotting, one-third natural size. Fig. 3, abnormal development of third ray of dorsal, from another specimen. Plate 55.—Fig. 1, female, one-third natural size. Fig. 1*a*, scales of middle of body, natural size. Fig. 1*b*, scale from under adipose fin. Fig. 1*c*, scale from under third ray of dorsal fin. Fig. 1*d*, dentition, two-thirds natural size. Fig. 1*e*, section behind pectoral, half natural size. Fig. 1*f*, section in front of anal fin, half natural size. Fig. 1*g*, front view of head, one-half natural size.

Frederick McCoy.

PLATE



F.Schonfeld, illh. Prof. M.c Coy, direx.t Hamel & C.ie imp.

PLATE 56, FIG. 1.

ZYGÆNA MALLEUS (SHAW).

THE HAMMER-HEADED SHARK.

[Genus ZYGÆNA (CUV.). (Sub-kingd. Vertebrata. Class Pisces. Order Plagiostomata. Sub-ord. Selachoidea. Fam. Carchariidæ.)

Gen. Char.—Body fusiform, gradually tapering to end of tail; an anal and two dorsal fins; 1st dorsal fin without spines, opposite the space between the pectoral and ventral fins; caudal fin with a notch and a pit at its commencement; head broad, flattened, and elongate laterally with two oblong lobes, at the outer edge of which the eyes are placed, with a nictitating membrane. Nostrils on front edge of head; no spiracles; mouth semicircular, inferior; teeth of both jaws similar, oblique, with notch on outer side between pointed central cusp and base, smooth when young, serrated when old].

DESCRIPTION.—Ends of the transverse hammer-head nearly as wide as their posterior margins; nostrils near the eyes on anterior edge of head, prolonged in groove along greater part of front margin. *Color:* ashy brownish-grey above, whitish below; iris yellowish-white.

REFERENCE.—*Squalus zygæna* (Lin.), Syst. Nat., p. 399; *Zygæna malleus* (Shaw), Nat. Misc., t. 267.

Our Australian specimens of this most singularly shaped Shark are perfectly identical with those of the Mediterranean and English coast. The old Greek writers who describe the Fish named it *Zygæna* from the resemblance of the head to their balance, and they give the most exaggerated accounts of its ferocity. Oppian and Ælian refer to it as a source of danger to mariners, although curiously enough Pliny omits to mention it at all. The small size of the mouth and teeth prevents it really doing any very serious harm to large animals, and although active and fierce in habits "the monstrous balance-fish of ugly shape" is not very formidable.

The following are the dimensions of an averge sized specimen:—

Measurements.	ft.	ins.	lines.
Total length	5	8	0
Length from front to origin of dorsal	1	7	0
„ of base of dorsal	0	6	0
Height of dorsal	0	7	0
Length from front to anterior base of 2nd dorsal	3	7	6
„ of base of 2nd dorsal	0	1	9
Height of anterior part of 2nd dorsal	0	1	6
„ of posterior lobe	0	3	6
Length from anterior origin of base of caudal fin to tip ...	1	5	0
Depth of lower lobe of caudal	0	6	0

Measurements.	ft.	ins.	lines.
Length from front to origin of pectoral	1	1	0
„ of base of pectoral	0	3	3
„ of anterior margin of pectoral	0	7	6
„ from front to anterior base of ventral	2	6	6
„ of base of ventral	0	2	0
„ of anterior margin of ventral	0	2	3
„ of posterior margin of ventral	0	4	0
„ from front to anterior edge of base of anal fin	3	5	6
„ of base of anal	0	2	0
„ of anterior margin	0	2	6
„ of posterior margin...	0	3	0
Width of head	1	5	6
Length of lateral ends	0	4	6
Width across posterior angles of mouth	0	5	6
„ of mouth	0	4	6
Length of largest teeth	0	0	3
Diameter of orbit	0	1	0
Length of middle gill-openings	0	2	0

Explanation of Figures.

Plate 56.—Fig. 1, lateral view, greatly reduced. Fig. 1*a*, underside of head to show proportion of lateral lobes and position of nostrils near eye on front edge. Fig. 1*b*, tooth of upper jaw, natural size. Fig. 1*c*, tooth of lower jaw, natural size.

Plate 56, Fig. 2.

PRISTIOPHORUS NUDIPINNIS (Günth.).

The Common Australian Saw-Fish.

[Genus PRISTIOPHORUS (Müll. and Henle). (Sub-kingd. Vertebrata. Class Pisces. Order Plagiostomata. Sub-ord. Selachoidea. Fam. Pristiophoridæ.)

Gen. Char.—Snout produced into a long, flat lamina, having a row of very unequal teeth projecting in one plane from the lateral edge. Body elongate, slender, fusiform; pectoral fins large, with free margins, much behind head; gill-openings lateral, in front of pectoral; spiracles wide, behind the eye. No nictitating membrane; nostrils inferior; a pair of long tentacles from underside of snout; teeth of mouth very small, in many close rows, with small cusp from broad base. Dorsal fins without spines, first in front of the ventrals, second behind them; no anal fin; caudal fin notched. Japan and Australia.]

Description.—Yellowish-brown, paler beneath; lateral teeth of snout very unequal, from 1 to 4 small ones irregularly between each pair of larger, a row of smaller, more equal teeth hooked backwards on the underside of the outer edge; nostrils considerably farther from first gill-opening than from tentacles; scales minute, nearly smooth, 3 or 5 slight ridges at base, the middle one faintly extended as a keel; 35 rows of teeth at edge of upper jaw.

Reference.—Günther, Cat. Fish. Brit. Mus. v. 8, p. 432.

The following are the dimensions of an average sized specimen :—

Measurements.	ft.	ins.	lines.
Length from tip of tail to end of saw	3	6	0
„ from tip of saw to mouth	0	9	0
„ from tip of saw to base of tentacles	0	5	3
„ of tentacles	0	2	6
„ from nostril to corner of mouth	0	2	0
Diameter of orbit	0	1	0
Length of spiracle	0	0	9
„ from tip of snout to front edge of orbit	0	8	0
„ from posterior edge of orbit to upper end of spiracle	0	0	3
„ from tip of snout to front edge of pectoral ...	1	1	0
„ to edge of 1st dorsal	1	7	0
„ to front edge of 2nd dorsal	2	4	9
„ of base of 1st dorsal	2	6	0
Greatest height	0	3	0
Length of base of 2nd dorsal	0	2	6
Height of 2nd dorsal	0	2	9
Length from tip of snout to front edge of ventrals ...	1	11	0
„ of base of ventrals	0	2	3
„ of front edge of ventrals	0	2	6
„ of posterior edge of ventrals	0	2	0
„ from hind base of tentacle to anterior edge of nostril	0	2	6
„ from anterior edge of nostril to anterior edge of anterior gill-opening	0	3	6

Teeth of mouth in 3 or 4 rows with broad oval base, and vertical, conical, central cusp about equalling the length of the base in height.

About 19 scales in a space of 3 lines about middle of body.

The ridging of the scales varies in different parts of the body; very generally the margin is smooth, not reached by any of the ridges, the centre one is often longest, like a keel, and the other two, four or more at base, much shorter, but sometimes they are all nearly equally developed.

The naked, or scaleless, portion of the fins, from which the specific name is derived, varies in different individuals, and is not, I think, a true character, as most of my specimens have the dorsal and pectorals completely covered with scales, as in other Sharks. There is a narrow ridge on each side of the ventral surface of the tail from half-way between ventral and second dorsal converging to anterior margin of lower lobe of caudal fin.

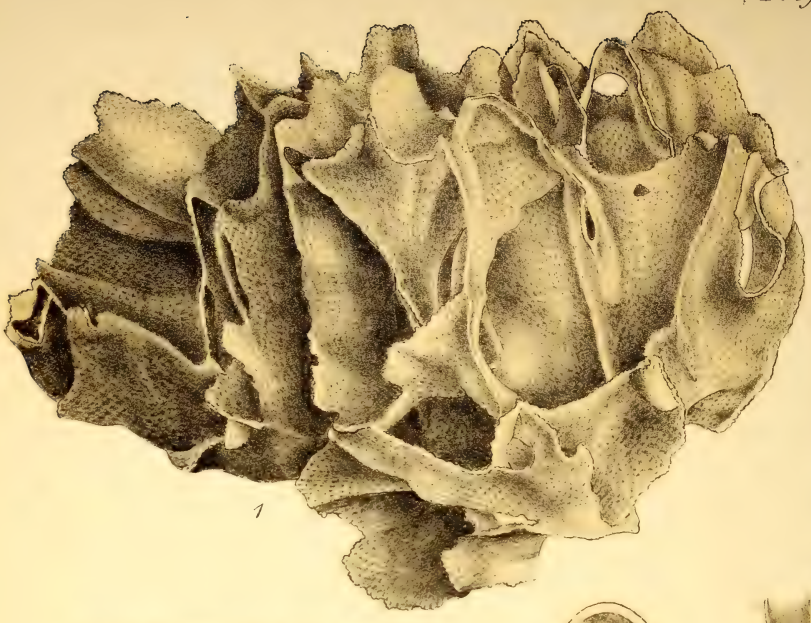
This Saw-Fish is very common in Hobson's Bay, but it is now figured for the first time.

Explanation of Figures.

Plate 56.—Fig. 2, side view, greatly reduced. Fig. 2*a*, under view of snout, less reduced, to show the character of the lateral teeth, the crescentic mouth, and the relative position of the tentacles and nostrils. Fig. 2*b*, lower scales, natural size and magnified. Fig. 2*c*, teeth of jaw, magnified. Fig. 2*d*, upper scales, natural size and magnified.

Frederick McCoy.

(Polyzoa)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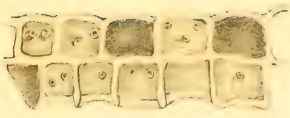
1c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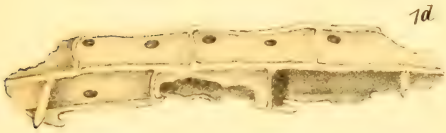
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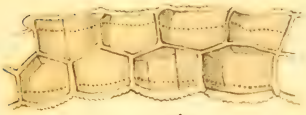
1b

1a


2a

2

3b

3

3a

J. Ripper del.
A. Bartholomew lith.

Prof. McCoy direxit

Steam litho, Govt. Printing Office.

Plate 57, Fig. 1.

BIFLUSTRA PERFRAGILIS (P. MacGil.).

[Genus BIFLUSTRA (D'Orbigny). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-ord. Cheilostomata. Fam. Membraniporidæ.)

Gen. Char.—Polyzoary usually consisting of two layers of horizontal cells placed back to back and easily separable, occasionally of a single adnate layer; cells large, more or less quadrate, with rigid raised margins, and the front partly occupied by a broad, usually granular lamina.]

Description.—Cells much elongated, slightly arched above, raised margins minutely granular; the lamina smooth or finely granular, occupying about the lower third of the front of the cell, and extending as a narrow rim a short distance up the sides, leaving an oval or elliptical aperture.

Reference.—*B. fragilis,* P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

King's Island, Bass's Straits; Port Phillip Heads.

This species is usually found in two layers of cells, the resulting lamina being variously twisted and united so as to form an extremely delicate cavernous polyzoary. This double arrangement is, however, not constant, and I have a specimen of *Eschara mucronata* on the surface of which a single layer has extended from a mass of the ordinary double form. The cells are elongated, usually about three times as long as broad; the raised margins and lamina are nearly smooth or very finely granular. In some specimens, however, the cells are shorter, the ridges and lamina stronger, and the granulations coarser, approximating to the structure in the next species.

Explanation of Figures.

Plate 57.—Fig. 1, specimen, natural size. Fig. 1*a*, portion, magnified. Fig. 1*b*, single cell from same specimen, more highly magnified. Fig. 1*c*, two cells from another specimen, with the membrane filling the aperture entire, and showing the mouth at the upper part. Fig. 1*d*, section, showing the sides of the cells. Fig. 1*e*, section, showing the ends of the cells.

* In different descriptions "zoarium" is used for "polyzoary," "zoœcium" is used for "cell," and "oœcium" is used instead of "ovicell."

PLATE 57, FIG. 2.

BIFLUSTRA DELICATULA (BUSK).

DESCRIPTION.—Cells quadrate, usually not more than twice as long as broad; margin very thick and regularly granular or tubercular; lamina thick, granular on the surface and edges, leaving a broadly elliptical aperture.

REFERENCE.—Busk, Crag Polyzoa, p. 72; pl. i., fig. 1.

Queenscliff.

Like the last, *B. delicatula* usually occurs in two layers, forming a cavernous mass; and of this condition I have fine specimens from Port Curtis, in Queensland. The cells are broader than in *B. fragilis;* the septa and lamina much thicker and more strongly granular; the markings extending almost as short transverse ridges. The only Victorian specimen I have seen occurs in a *Membranipora* form as a single layer creeping over a narrow seaweed. In it the cells are much smaller, but do not otherwise differ from those of the Port Curtis specimens. The serrated denticle at the bottom of the aperture exists only in two or three of the cells of the Queenscliff specimen, and is altogether absent in those from Queensland, but, with that exception, they agree precisely with Busk's description and figure.

EXPLANATION OF FIGURES.

PLATE 57.—Fig. 2, portion, magnified, of a specimen from Port Curtis, in which the cells were arranged in a double layer, the polyzoary being twisted and cavernous as in fig. 1. Fig. 2*a*, end view of cells from the same specimen, showing the dovetailed arrangement which frequently, but not always, exists in this species. Fig. 3, specimen occurring in a single layer, encrusting a narrow seaweed. Fig. 3*a*, portion of the same specimen, magnified to the same extent as fig. 2. Fig. 3*b*, a small group of cells from the same, more highly magnified; the two large cells show the broad serrated denticle at the bottom of the aperture.

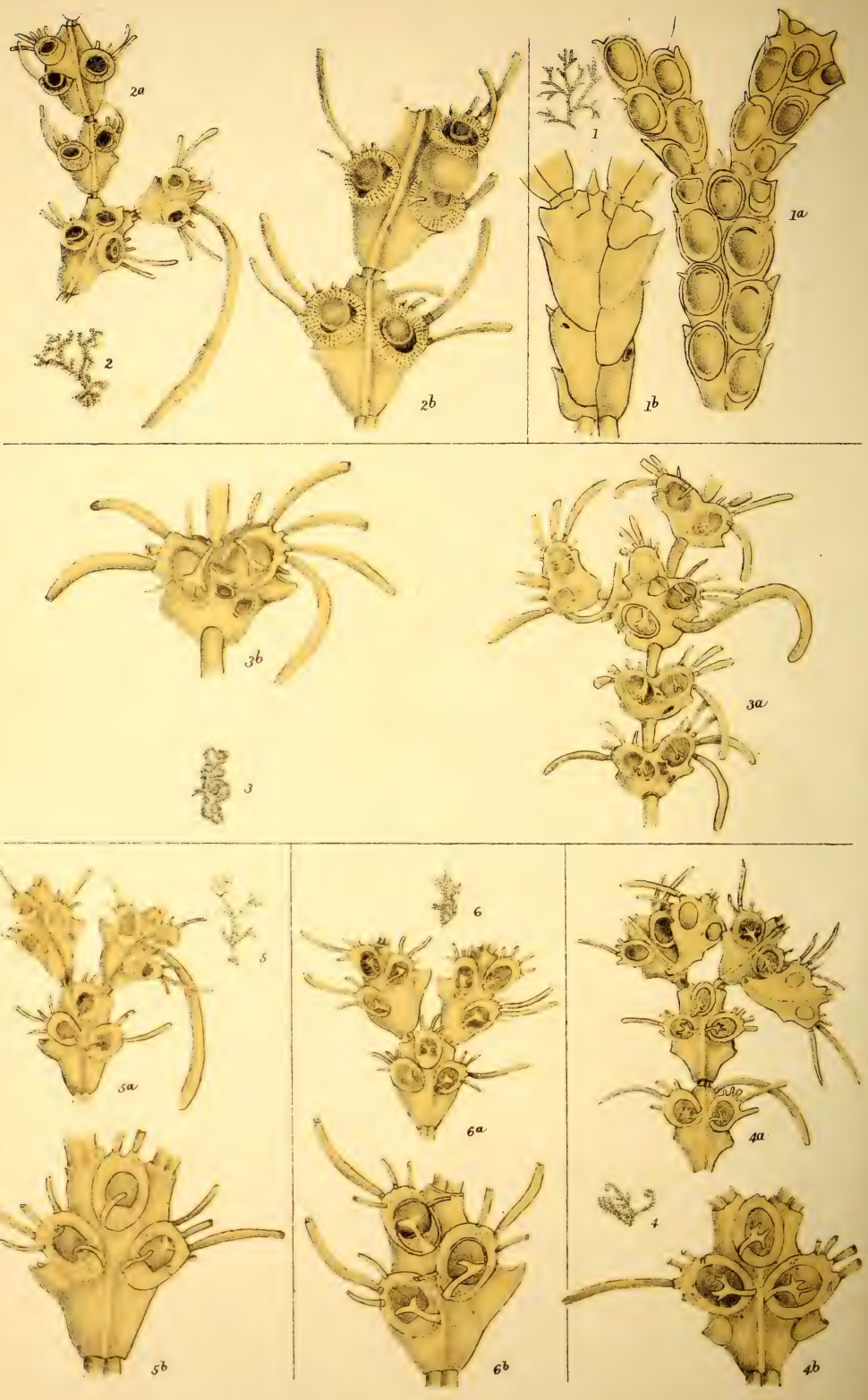
The genus *Biflustra* was proposed by D'Orbigny for a large number of forms, mostly fossil, characterised by having cells similar to those of *Membranipora*, but disposed in two layers placed back to back and easily separable. All the species figured in the

Paléontologie Française are either subcylindrical or compressed and ramose. In the Crag Polyzoa, Busk adopts the genus and describes and figures *B. delicatula* from fossil specimens from the Crag, and recent ones from Australia. I believe the genus to be a good one, excluding, however, many forms referred to it by D'Orbigny. Lamarck's *Eschara chartacea* is probably one or both of the species here described.

The specimens and descriptions of the above species are from Mr. MacGillivray.

FREDERICK McCOY.

(Polyzoa)



J. Ripper del
A. Bartholomew lith.

Prof. M.c Coy direct.

Steam litho, Govt. Printing Office

PLATE 58, FIG. 1.

CELLULARIA CUSPIDATA (BUSK).

[Genus CELLULARIA (PALLAS). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-ord. Cheilostomata. Fam. Cellulariidæ.)
Gen. Char.—Cells bi-triserial, oblong or rhomboidal, contiguous, usually perforated behind. Without avicularia or vibracula.]

DESCRIPTION.—Cells oblong; aperture with the margin thickened and nearly smooth; outer angle of the cells and the summit of the median cell at a bifurcation, produced into a short sharp spine. A single perforation behind.
REFERENCE.—Busk, Brit. Mus. Cat. Mar. Polyzoa, p. 19, pl. xxvii., figs. 1, 2.

Queenscliff and other places; common.

Forms whitish, curling tufts, from ½ inch high upwards, attached to algæ and zoophytes. It is at once distinguished by the pointed process on the upper and outer angle of the cells and by the similar strong cusp on the summit of the median cell at a bifurcation. In old or worn specimens the single posterior perforation cannot usually be distinguished. I have not seen the ovicell, but according to Busk it is smooth.

EXPLANATION OF FIGURES.

PLATE 58.—Fig. 1, specimen, natural size. Fig. 1*a*, front view of the same, magnified. Fig. 1*b*, view of back, magnified; in two cells the posterior perforation is shown.

PLATE 58, FIG. 2.

MENIPEA CRYSTALLINA (GRAY SP.).

[Genus MENIPEA (LAMX.). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-ord. Cheilostomata. Fam. Cellulariidæ.)
Gen. Char.—Cells oblong, abbreviated or elongated and narrowed downwards; imperforate behind; a sessile lateral avicularium (frequently absent) and one or two sessile avicularia (also frequently absent) on the front of the cell. Ovicell globular, immersed in the internode.]

* In different descriptions "zoarium" is used for "polyzoary," "zoœcium" is used for "cell," and "oœcium" is used instead of "ovicell."

DESCRIPTION.—A pair of cells in an internode, with three at a bifurcation; connecting tubes short and double; aperture nearly circular, largely filled in by a tubercular calcareous plate, usually broader below and leaving a subtriangular opening; 3 or 4 long slender spines articulated to the upper and outer margin of the aperture. Avicularium, when present, with the mandible opposite the calcareous plate filling in the lower part of the aperture. Ovicell deeply immersed.

REFERENCE.—Gray, Dieffenbach, New Zealand, ii. 293; Busk, Brit. Mus. Cat. Mar. Pol., p. 28, pl. xl.

Queenscliff and other places.

Forms small curling tufts attached to algæ and polyzoa. The avicularia are frequently wanting in all the cells of a specimen. When present they are small and situated so that the mandible opens opposite the lower edge of the aperture. When ovicells are present there are three cells in an internode, the ovicell being globular and deeply immersed in the upper cell, which is situated to one side and not mesially, as in the tricellular internode of a bifurcation. In this species, as in *M. cervicornis*, in addition to the usual bifurcating branches, one occasionally springs from the front of a cell.

EXPLANATION OF FIGURES.

PLATE 58.—Fig. 2, specimen, natural size. Fig. 2*a*, portion, magnified. Fig. 2*b*, two internodes, more highly magnified; a deeply immersed ovicell is shown in the upper cell of the upper internode, and the lateral avicularium is seen in the left-hand cell of the lower.

I follow Wyville Thomson, whose generic character I have given, in uniting *Emma* with *Menipea* as I cannot see that there is any sufficient distinction between the two genera. *Emma* is distinguished from *Menipea* by the aperture being contracted by a more or less granular plate, and by the lateral avicularia being situated below the level of the opening. All the species here described certainly belong to the same genus. In *M. cyathus* the granular plate is replaced by a slightly thickened rim, occasionally wider at the lower part; and the situation of the avicularium varies from opening opposite the upper third, as in *M. Buskii*, to opposite the lower edge of the aperture, as in *M. crystallina*.

PLATE 58, FIG. 3.

MENIPEA CYATHUS (WYV. THOMSON).

DESCRIPTION.—A pair of cells in an internode, with three at a bifurcation; connecting tube single; aperture of cell oval, oblique; 3 to 6 long spines, several of which are pod-like, articulated to the upper and outer margin; opercular spine springing from the upper and inner margin of the aperture and pointed downwards, divided into two or more processes. Avicularium opening opposite the upper third of the opening.

REFERENCE.—Wyville Thomson, Dublin Natural History Review, vol. v. (1858), p. 143, pl. xv., figs. 10, 10*a*.

Queenscliff.

M. cyathus differs from the other species here described in the connecting tubes being long and single. The cells project considerably; the aperture is oval or elliptical; the calcareous plate is reduced to a simple marginal ring. From the upper cell there are usually 6 spines and from the lower 4, but the number is not constant. Several are usually very large and pod-like. The opercular spine is directed downwards and outwards from the upper and inner part of the margin; in the upper of the two cells of an ordinary internode and in the median one at a bifurcation it is usually simply bifid, and in the others each branch generally again divides so as to form four points. The avicularium is of considerable size, and opens opposite the junction of the middle and upper thirds of the aperture. Besides the lateral avicularia there is occasionally a sessile avicularium in front between the cell apertures. In the lower part of the front of the upper of two cells of an internode, there is constantly a round mark with an annular margin from which a radicle tube occasionally springs.

EXPLANATION OF FIGURES.

PLATE 58.—Fig. 3, specimen, natural size. Fig. 3*a*, small portion, magnified; small sessile avicularia are shown on the front of three of the internodes, and in the internode of bifurcation a radicle tube is also seen. Fig. 3*b*, single internode, more highly magnified; in addition to the constant round mark there is in this specimen another similar mark immediately below the anterior sessile avicularium.

PLATE 58, FIG. 4.

MENIPEA CERVICORNIS (P. MACGIL.).

DESCRIPTION.—A pair of cells in an internode, with three at a bifurcation; connecting tubes double; aperture oblique, partly filled in by a faintly granular calcareous plate; 4 to 6 hollow spines, of which several are generally larger and pod-like, articulated to the outer margin. Opercular spine springing from the inner and lower part of the aperture, enlarged and branched at the extremity. Avicularia large, opening nearly opposite the lower edge of the aperture.

REFERENCE.—*Emma cervicornis,* P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

Queenscliff.

The branched opercular spine, springing from the inner and lower part of the aperture, readily distinguishes this from the other two-celled species. In addition to the branches of bifurcation others frequently rise from the front of a cell, usually the lower in an internode. The openings of these face the cells from which they rise.

EXPLANATION OF FIGURES.

PLATE 58.—Fig. 4, specimen, natural size. Fig. 4*a*, portion, magnified, showing, in addition to the details of the cells, also two branches originating from the front of the upper internodes. Fig. 4*b*, three-celled internode at a bifurcation, more highly magnified.

PLATE 58, FIG. 5.

MENIPEA TRICELLATA (BUSK).

DESCRIPTION.—Cells three in an internode, narrowed downwards, elongated; connecting tubes short and double; aperture small, with a granular thickened margin; 4 or 5 long slender spines articulated to the upper and outer margin; opercular spine simple, springing from the inner margin. Avicularia opening nearly opposite the lower edge or middle of the aperture.

REFERENCE.—Busk, Voy. *Rattlesnake,* i., 373; Brit. Mus. Cat. Mar. Polyz., p. 28, pl. xli.

Queenscliff.

This species is easily distinguished from *M. Buskii* by the simple opercular spine, as well as by the cells being much more elongated and narrow. The avicularia are frequently absent.

Explanation of Figures.

Plate 58.—Fig. 5, specimen, natural size. Fig. 5*a*, portion, magnified. Fig. 5*b*, internode (of bifurcation), more highly magnified.

Plate 58, Fig. 6.

MENIPEA BUSKII (Wyv. Thomson).

Description.—Cells three in an internode; connecting tubes short and double; cells short and wide; aperture round, with a thickened, granular, calcareous margin, straightened below; usually 4 spines at the upper margin, of which the second or second and third from the outer edge are much larger and thicker, and there is frequently another smaller one on the inside. Opercular spine attached to the inner and lower part of the aperture, clavate. Avicularium opening opposite the middle or upper third of the aperture.

Reference.—Wyville Thomson, Dublin Nat. Hist. Review, vol. v., p. 144, plate xii., fig. 1.

Queenscliff.

Forms small tufts adhering to algæ and zoophytes. Readily distinguished by the three cells in an internode and the peculiar clavate opercular spine. I have not seen ovicells, but they are described by Thomson as being "spherical, with a richly granular surface, imbedded among the cells, on the cavity of two of which it encroaches.

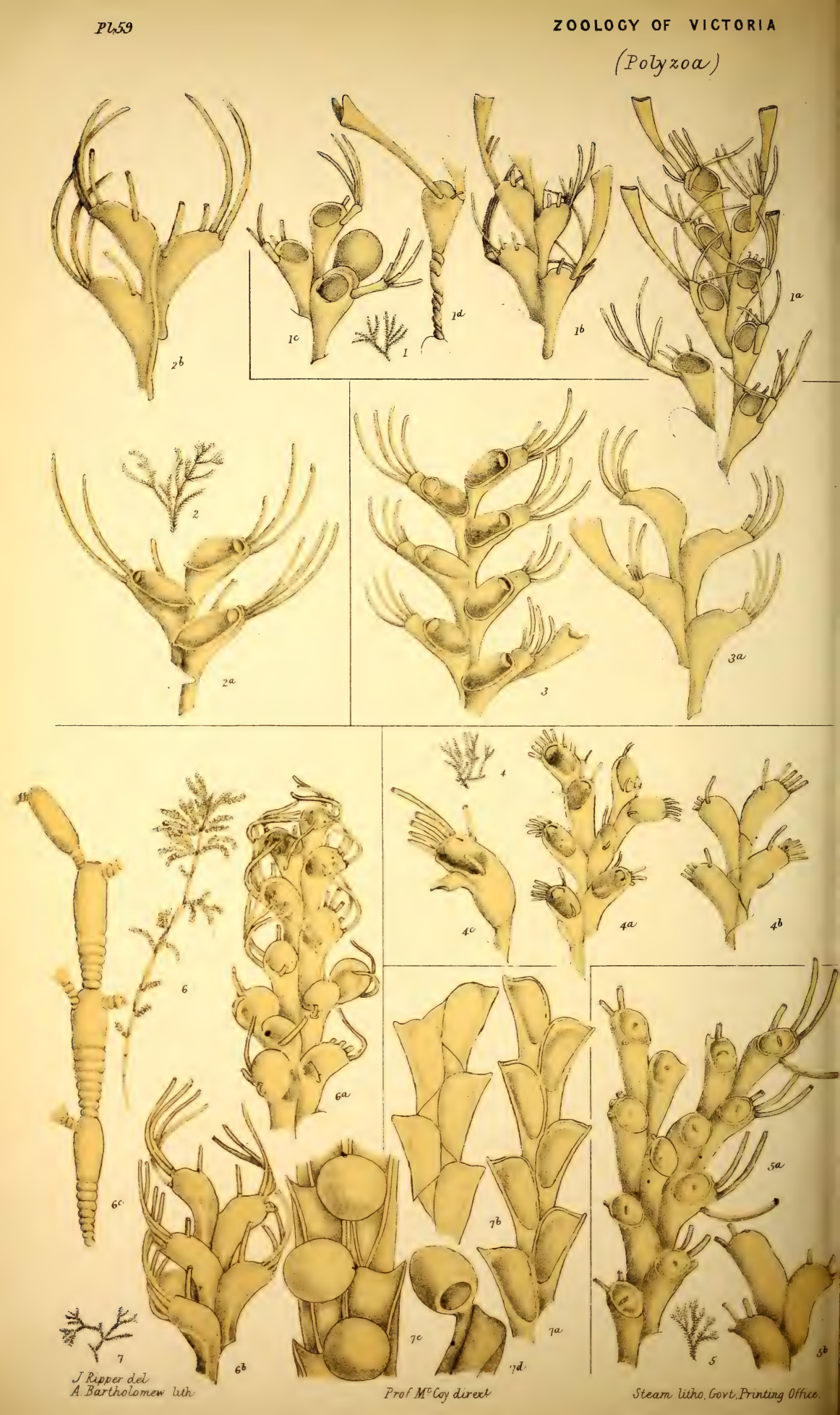
Explanation of Figures.

Plate 58.—Fig. 6, specimen, natural size. Fig. 6*a*, portion, magnified. Fig. 6*b*, internode, more highly magnified.

I am indebted to Mr. MacGillivray for the specimens and descriptions illustrated by this plate.

Frederick McCoy.

(Polyzoa)



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Prof. M^c Coy direxit

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PLATE 59, FIG. 1.

BICELLARIA TUBA (BUSK).

[Genus BICELLARIA (BLAINVILLE). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-ord. Cheilostomata. Fam. Bicellariidæ.)

Gen. Char.—Branches continuously celluliferous; cells biserial, turbinate, more or less free above, aperture directed upwards and forwards, with several marginal or submarginal spines.]

DESCRIPTION.—Cells elongated, considerably narrowed downwards; aperture nearly round, looking obliquely upwards and forwards; 3 or 4 long submarginal spines, and one short thick process at the anterior and outer part, with 3–6 long spines articulated to its summit. Avicularium very long and trumpet-shaped, with a minute mandible on the summit. Ovicell globular, placed at the summit of a cell.

REFERENCE.—Busk, Voy. Ratt., i., 373; Cat. Mar. Pol. Brit. Mus., p. 42, pl. xxxi.

Queenscliff; Western Port; Portland, Mr. Maplestone.

This species forms large, handsome dense tufts, sometimes 5 or 6 inches high. It is usually of a delicate pink color, but sometimes of a silvery grey; the cells in the latter being rather smaller and more slender, but not otherwise differing. It is readily distinguished by the peculiar thick process, springing from below and behind the anterior and outer part of the margin, to the outer extremity of which 3–5 long processes are articulated. The avicularia are very peculiar. They are trumpet-shaped, very narrow, considerably longer than the cells, to the back of which, a little below the margin, they are articulated; a minute mandible is situated in a transverse cup-shaped hollow on the summit. One of the spines is frequently lower down the back than the others. A branch sometimes rises by a spirally twisted stem.

EXPLANATION OF FIGURES.

PLATE 59.—Fig. 1, fragment, natural size. Fig. 1*a*, front view, magnified, showing the thick process with its digitiform spines and several long trumpet-shaped avicularia. Fig. 1*b*, back of portion of same. Fig. 1*c*, ovicell. Fig. 1*d*, portion of a branch originating by a spirally twisted stem; shows also an avicularium with its small mandible.

* In different descriptions "zoarium" is used for "polyzoary," "zoœcium" is used for "cell," and "oœcium" is used instead of "ovicell."

PLATE 59, FIGS. 2 AND 3.

BICELLARIA GRANDIS (BUSK).

DESCRIPTION.—Cells large, much expanded above, spreading outwards, with a large nearly horizontal aperture. A variable number of spines from the outer edge.

REFERENCE.—Busk, Voy. Ratt., i., 374; Cat. Mar. Pol. Brit. Mus., p. 42, pl. xliv.

Queenscliff; Cape Otway, Mr. J. Payter.

B. grandis differs from the other species in the large size of the cells, in their being very narrow below and expanded widely above, and in the large, nearly horizontal, elliptical opening. There are two marked varieties. In the one there are several spines rising separately immediately behind and below the aperture, some of which occasionally originate together from a wide prolongation of the cell. In this form there is constantly a separate spine about half-way down the back of the cell. The aperture is frequently pointed at its inner end. I have not seen the avicularia. This is the form described and figured by Busk. In the other, the cell is prolonged immediately below the outer margin into a broad process, to the end of which all the spines are attached. There is no posterior spine. The avicularia are similar to those of *B. tuba*, but are shorter and stouter. I was at first inclined to consider them as distinct species, but as in the first variety the spines frequently spring from a production of the outer part of the cell, and in our ignorance of the structure of the avicularia the only constant difference is in the presence of the posterior spine, I think it is better, for the present at least, to unite them. The second form may be called var. *producta*.

EXPLANATION OF FIGURES.

PLATE 59.—Fig. 2, fragment, natural size. Fig. 2*a*, portion of typical form, magnified. Fig. 2*b*, back of same, showing the posterior spines. Fig. 3, front view of portion of var. *producta*, magnified, showing the broad spiniferous extension of the cell and an avicularium. Fig. 3*a*, back of the same.

PLATE 59, FIG. 4.

BICELLARIA CILIATA (LINN.).

DESCRIPTION.—Cells very small; outer margin with about 6 long slender spines; a small spine on the front of the cell immediately below the aperture, and another a short distance down the back. Avicularia small, capitate, attached to the outer part of a cell. Ovicells small, round, on the inner margin of the aperture.

REFERENCE.—Busk, Cat. Mar. Pol. Brit. Mus., p. 41, pl. xxxiv.

Queenscliff; Portland, Mr. Maplestone.

Of the form now described I have only seen two or three small fragments; in all of them the spine in front is simple, and I can see no difference between it and the European *B. ciliata*. Busk's *B. gracilis* differs in the form of the cells, and in the presence of a fine double spine in front. I had specimens with a double spine which I referred to it, but they have unfortunately been lost, and I have no description or figure.

EXPLANATION OF FIGURES.

PLATE 59.—Fig. 4, specimen, natural size. Fig. 4*a*, front view, magnified. Fig. 4*b*, back of same. Fig. 4*c*, a single cell, more highly magnified, showing a small capitate avicularium.

PLATE 59, FIG. 5.

BICELLARIA TURBINATA (P. MACGIL.).

DESCRIPTION.—Cells turbinate, elongated, much contracted below, upper part scarcely free; aperture nearly circular, with 3 or 4 long submarginal spines from the upper and outer margin.

REFERENCE.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1869.

Queenscliff.

Of this species, I have only a single tuft. It is quite distinct, and easily recognisable by the long, slightly expanded, turbinate cells, the nearly circular aperture, and the 3 or 4 submarginal spines.

EXPLANATION OF FIGURES.

PLATE 59.—Fig. 5, portion, natural size. Fig. 5*a*, front view, magnified. Fig. 5*b*, back view.

PLATE 59, FIG. 6.

STIRPARIA ANNULATA (MAPLESTONE).

[Genus STIRPARIA (GOLDSTEIN). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-ord. Cheilostomata. Fam. Bicellariidæ.)

Gen. Char.—Celluliferous branches attached in regular tufts to a bare, annulated, corneous common stem. Cells biserial, turbinate, aperture looking upwards and forwards and with marginal spines.]

DESCRIPTION.—This species forms beautiful tufts about three inches high. Each branch is formed of a soft corneous stem, narrowed at intervals of about an eighth of an inch. The narrow parts are regularly and distinctly annulated, but not articulated ; the annulations extend, especially in the older portions, to a greater or less extent on the swollen fusiform parts, more prominently at their bases. The lower parts of the stems have no cell-bearing branches. These are attached regularly, one on each side at the summit of a spindle-shaped portion, by a short annulated stem, which swells at the top and bifurcates, the divisions again rapidly bifurcating, so as to form beautiful fan-shaped tufts. The cells are turbinate. The aperture is large, opening upwards and forwards. There are usually 4 very long, incurved spines articulated closely together to the outer edge, a separate spine from the inner part of the aperture passing behind the cell above, and another separate spine on the front of the cell below the aperture. The cells are distinct behind, and each has a peculiar bifurcate mark on the back. The ovicells are cucullate, attached to the outer edge of the margin of the aperture.

REFERENCE.—*Bicellaria annulata,* Maplestone, Journ. Microp. Soc. Vict. 1879.

Cape Otway, Mrs. George Caldwell ; Portland, Mr. Maplestone.

EXPLANATION OF FIGURES.

PLATE 59.—Fig. 6, branch, natural size. Fig. 6*a*, front view, magnified, showing the arrangement of the spines and ovicells. Fig. 6*b*, back view, showing the peculiar bifurcate mark. Fig. 6*c*, portion of the common stem, magnified.

PLATE 59, FIG. 7.

BUGULA NERITINA (LINN.).

[Genus BUGULA (OKEN). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-ord. Cheilostomata. Fam. Bicellariidæ.)

Gen. Char.—Cells bi-multiserial, closely contiguous, aperture very large, directed forwards, the margins not at all or very slightly thickened.]

DESCRIPTION.—Cells biserial, elongated, upper edge straight, with the angles projecting; aperture large, occupying nearly the whole front. No avicularia. Ovicells large, situated at the upper and inner angles of the cells.

REFERENCE.—Busk, Cat. Mar. Polyz. Brit. Mus., p. 44, pl. xliii.

Hobson's Bay; Queenscliff; Warrnambool, Mr. Watts.

Bugula neritina is readily distinguished from the other Victorian species. It forms small tufts of a brownish color. The cells are straight above, each angle projecting as a short spine; the aperture is very large, the margin very slightly thickened. I have never seen avicularia. The ovicells are large, rounded, situated at the upper and inner angles of the cells. They are pearly white (in dried specimens) and are very conspicuous against the brown of the rest of the polyzoary.

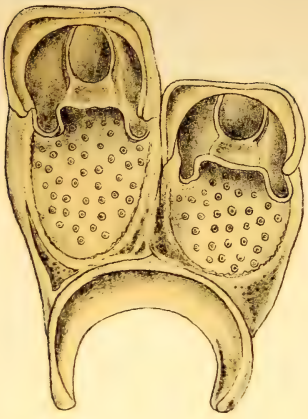
EXPLANATION OF FIGURES.

PLATE 59.—Fig. 7, portion, natural size. Fig. 7*a*, cells, magnified, front view. Fig. 7*b*, cells magnified, back view. Fig. 7*c*, small portion to shew ovicells, magnified. Fig. 7*d*, single cell, viewed from the outside, showing attachment and opening of an ovicell.

The specimens and descriptions of the above *Bicellariidæ* were presented by Mr. MacGillivray.

FREDERICK MCCOY.

(Polyzoa)



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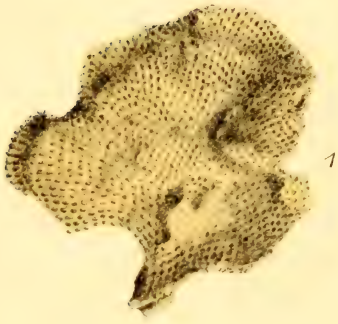

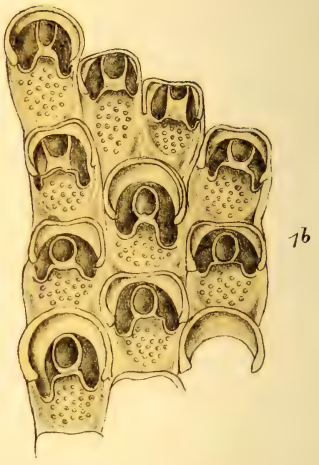

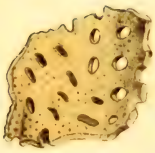

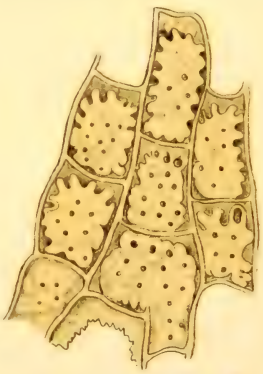

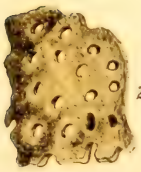

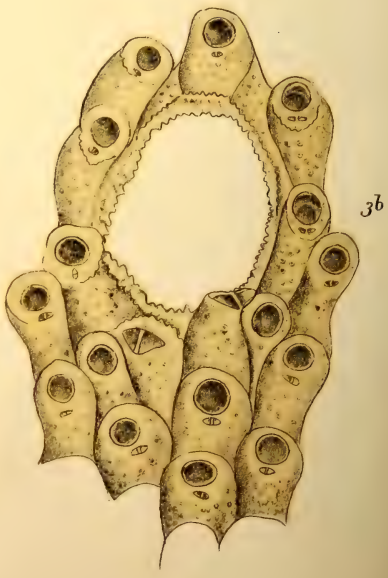

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P.H.Mac Gillivray del.
A.Bartholomew lith.

Prof. McCoy dirext

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PLATE 60, FIG. 1.

STEGANOPORELLA MAGNILABRIS (BUSK SP.).

[Genus STEGANOPORELLA (SMITT). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-ord. Cheilostomata. Fam. Steganoporellidæ.)

Gen. Char.—Polyzoary expanded, formed of a single layer of cells, or of two united back to back; cells with calcareous raised margins; a membranous layer stretched across the front of each cell and separated from the receding calcareous layer, so as to leave a space or chamber between the two; operculum of outer wall very large, orifice of inner nearly circular.]

DESCRIPTION.—Polyzoary rigid, expanded, usually sub-erect; cells quadrate, arranged in linear and alternate series, in a single layer or in two placed back to back; margins raised, calcareous. A separate membranous layer, stretched tightly across the front of the cell; operculum very large, attached on each side to a projecting process of the cell-margin and strengthened by a narrow corneous band. Inner wall a calcareous, punctured lamina, extending forwards and downwards so as to leave a chamber between it and the outer membrane; it opens by a nearly circular mouth, with projecting margin, behind which a broad square plate, with the sides turned down and united to the lamina, rises to the articulating base of the operculum.

REFERENCE.—*Membranipora magnilabris*, Busk, Cat. Mar. Pol. Brit. Mus., p. 62, pl. lxv., fig. 4 = *Steganoporella elegans*, Smitt, Floridan Polyzoa, Part ii., p. 15, pl. iv., figs. 96–101.

Portland, attached to piles, Mr. Maplestone; Queenscliff.

I have only seen dried specimens of this very peculiar species, the structure of which it is to be hoped will ere long be examined in the living state. It seems to be identical with Smitt's *S. elegans* described from the Gulf of Florida, and no doubt Smitt is correct in considering Busk's *Membranipora magnilabris* as the membranipora form of the same species. The only difference I can detect in the Australian specimens is that the ordinary cells are more quadrate, and that the large rounded opercula are usually denticulate on the margin. The fossil *Eschara elegans* of Milne Edwards is considered by Smitt to be the same species, but I think that determination doubtful, and I have therefore adopted Busk's specific name.

It is found as a single layer encrusting other objects, or partly free and foliaceous; at other times it consists of two layers united

* In different descriptions "zoarium" is used for "polyzoary," "zoœcium" is used for "cell," and "oœcium" is used instead of "ovicell."

back to back. The specimens are sometimes of considerable size, and one presented to the Museum by Mr. Goldstein forms an irregular foliaceous mass measuring about 13 inches long by 9 inches wide and 6 inches high.

The cells are large, mostly quadrate, the margins thick and raised, and with the external membrane tightly stretched across the aperture. The movable lip is very large, occupying about half the aperture, and is of two forms. Most of the cells are quadrate at the anterior extremity, and in these the square operculum is strengthened by a fine band at a little distance from and nearly parallel to the margin. Other cells, usually of a larger size, and frequently situated at the bifurcation of a series, are rounded in front; in these the operculum is strengthened by two bands, which converge from the base in an arched form, and when close to the margin slightly diverge again, becoming blended with the marginal corneous rim. This form of operculum is generally finely denticulate at the margin. When the outer membrane is removed, the margins of the cells are seen to be thick, calcareous, the portion behind the attachment of the operculum bevelled inwards, the bevelled surface being finely granular; the part corresponding to the margin of the operculum forms a smooth, deeply vaulted arch, the posterior angles of which are produced into a tubercle on each side for the attachment of the corners of the lip. The inner wall is a thin calcareous lamina, pierced by numerous white-bordered pores; it recedes downwards and forwards, the anterior part being very abrupt, and opens by a nearly circular sloping mouth, with raised cylindrical margins. Immediately behind this opening a square plate extends upwards and backwards to the articulating base of the operculum, its lateral edges being turned down and united to the lamina so as to form a sort of recess or pouch. The posterior part of the raised inner orifice is united to this plate.

Explanation of Figures.

Plate 60.—Fig. 1, specimen, natural size. Fig. 1*a*, portion, magnified, showing membranous layer, two sorts of cells, the one quadrate with smooth-edged opercula, strengthened by a square-shaped horny band, parallel to and at a little distance from the margin, the other rounded anteriorly, with rounded denticulate opercula and different shaped strengthening bands. Fig. 1*b*, portion denuded of membrane, magnified. Fig. 1*c*, two quadrate cells from the same, more highly magnified, showing the raised bevelled edges, the receding perforated calcareous wall, the internal mouth and the plate to the articulating base of the operculum with its edges turned down and continuous with the front of the lamina.

Plate 60, Fig. 2.

PETRALIA UNDATA (P. MacGil.).

[Genus PETRALIA (P. MacGil.). Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-ord. Cheilostomata. Fam. Escharidæ.)

Gen. Char.—Polyzoary stony, expanded, erect, fenestrate, formed of a single layer of cells placed horizontally side by side and distinct throughout the whole thickness of the polyzoary.]

Description.—Fenestræ broadly elliptical, margins tubercular, and with one or two large avicularia at the base of each in front. Cells quadrate, expanded above, slightly narrowed at the middle and below, separated by narrow raised lines; front tubercular and perforated; mouth circular, with a short broad transverse avicularium immediately below the lower lip. Behind, the cells are quadrate, deeply areolated and separated by channels, at the bottom of which is a narrow elevated ridge. Ovicells large, globular, closely punctate; frequently one or more immovable processes, surmounted by sessile avicularia, rise from various parts of the ovicell.

Reference.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

Portland, Miss F. Birkett; Queenscliff.

The polyzoary forms an expanded wavy frond, probably of considerable size, as all the specimens I have seen are broken on the edges. The avicularia occur in three different forms. Immediately below the mouth of each cell is a short transverse sessile avicularium, and at the lower edge of each foramen one or two large sessile avicularia take the place of ordinary cells. In addition to these the ovicells have usually one or more calcareous processes on various parts of the surface, each surmounted by a small sessile avicularium. The ovicells are crowded in patches, frequently united to each other, and on the cells supporting them are numerous sessile avicularia, usually on raised calcareous bases and generally arranged along the margins and round the mouths.

The only other genus of *Escharidæ* with a foraminate polyzoary, the cells of which are disposed in one plane, is *Retepora*. The arrangement of the cells, however, is very different in the two genera. In *Retepora* they are oblique and rest on a common calcareous basis, while in *Petralia* there is no such basis, but the cells are horizontal and as distinct on the back of the polyzoary as in the front.

EXPLANATION OF FIGURES.

PLATE 60.—Fig. 2, front view of specimen, natural size. Fig. 2*a*, back view of same. Fig. 2*b*, portion of front, magnified, showing a foramen with tubercular margins; at the base are seen two large avicularia replacing cells. Fig. 2*c*, portion of back, magnified, showing the distinct areolated cells, separated by raised ridges at the bottom of channels. Fig. 2*d*, small portion, magnified, showing three ovicells, one of which is studded with avicularia; numerous sessile avicularia, mostly on calcareous bases, are seen on the cells with which the ovicells are connected. Fig. 2*e*, fractured edge of polyzoary, to show the cells distinct throughout the whole thickness; the fracture was obliquely across the cells.

I am indebted to my friend Mr. MacGillivray for the specimens and descriptions of the two Polyzoa on this plate.

FREDERICK McCOY.

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CONTENTS OF DECADES.

N.B.—The originals of all the Figures are in the National Museum, Melbourne.

DECADE I.

PLATE 1.—The Black Snake (Pseudechys porphyriacus, Shaw sp.).
PLATE 2.—The Copper-head Snake (Hoplocephalus superbus, Günth.).
PLATE 3.—The Tiger Snake (Hoplocephalus curtus, Schl. sp.).
PLATE 4.—The Australian Bream (Chrysophrys Australis, Günth.).
PLATE 5.—The Spiny-sided Butterfly-Gurnard (Lepidotrigla Vanessa, Rich. sp.).
PLATE 6.—The Kumu Gurnard (Trigla Kumu, Lesson and Garn.).
PLATE 7.—The Australian Giant Earth-worm (Megascolides Australis, McCoy).
PLATE 8.—Lewin's Day-moth (Agarista Lewini, Boisd.).
The Loranthus Day-moth (Agarista Casuarinæ, Scott).
The Vine Day-moth (Agarista Glycine, Lewin sp.).
PLATE 9.—Pieris (Thyca) Harpalyce (Don. sp.).
PLATE 10.—Pieris (Thyca) Aganippe (Don. sp.).

DECADE II.

PLATE 11.—The Little Whip Snake (Hoplocephalus flagellum, McCoy). The White-lipped Snake (Hoplocephalus coronoides, Günth.).
PLATE 12.—The Death Adder (Acanthophis Antarctica, Shaw sp.).
PLATE 13.—The Carpet Snake (Morelia variegata, Gray).
PLATE 14.—The Gippsland Perch (Lates colonorum, Günth.).
PLATE 15.—The Murray Lobster (Astacoides serratus, Shaw sp.).
PLATE 16.—The Salmon Arripis (Arripis truttaceus, Cuv. sp.). Adult.
PLATE 17.—Ditto of the younger forms and coloring.
PLATE 18.—The Horse Mackerel (Trachurus trachurus, Lin. sp.).
PLATE 19.—The Small-scaled Rock Cod (Lotella callarias, Günth.).
PLATE 20.—The Australian Rock Cod (Pseudophysis barbatus, Günth.).

DECADE III.

PLATE 21.—The Sea-Leopard Seal (Stenorhynchus leptonyx, de Blainv. sp.).
PLATE 22.—The Yellow-sided Dolphin (Delphinus Novæ Zealandiæ, Quoy and Gaim.).
PLATE 23.—The Common Brown Snake (Diemenia superciliosa, Fisch.).
The Small-scaled Brown Snake (Diemenia microlepidota, McCoy).
The Shield-fronted Brown Snake (Diemenia aspidorhyncha, McCoy).
PLATE 24.—Catenicella margaritacea (Busk).—C. plagiostoma (Busk).—C. ventricosa (Busk).—C. hastata (Busk.)—C. rufa (McG.).—C. cribraria (Busk).—C. alata (Wyv. Thomson).—C. lorica (Busk).—C. formosa (Busk).—C. elegans (Busk).—C. perforata (Busk).—C. Buskii (Wyv. Thomson).—C. Hannafordi (McG.).—C. crystallina (Wyv. Thomson).—C. carinata (Busk).—C. aurita (Busk).—C. geminata (Wyv. Thomson).—C. cornuta (Busk).—C. intermedia (McG.)
PLATE 25.—Membranipora membranacea (Linn. sp.).—M. perforata (McG.).—M. ciliata (McG.).—M. mamillaris (McG.).—M. umbonata (Busk).—M. pilosa (Linn. sp.).—M. cervicornis (Busk).
PLATE 26.—Membranipora dispar (McG.).—M. Woodsii (McG.).—M. lineata (Linn. sp.).—M. Rosselii (Audouin sp.).—M. Lacroixii (Savigny sp.).
PLATE 27.—The Australian Rockling (Genypterus Australis, Cast.).
The Yarra Blackfish (Gadopsis gracilis, McCoy).
PLATE 28.—The Southern Mackerel (Scomber pneumatophorus, De la Roche).
PLATE 29.—The Yabber Crayfish (Astacoides bicarinatus, Gray sp.).
PLATE 30.—The Large Wattle Goat-Moth (Zeuzera Eucalypti, Boisd. Herr.-Schæf.).

DECADE IV.

PLATE 31.—The Australian Sea-Bear or Fur-Seal (Euotaria cinerea, Péron sp.).
PLATE 32.—The Two-hooded Furina-Snake, Furina bicucullata (McCoy).
PLATE 33.—The Banded Red Gurnet-Perch (Sebastes percoides, Solander sp.).
PLATE 34.—The Angel-fish (Rhina squatina, Lin. sp.).
PLATE 35.—Lepralia circinata (McG.).—L. Cecilii (Aud.).—L. diaphana (McG.).—L. marsupium (McG.).—L. subimmersa (McG.).—L. anceps (McG.).—L. Maplestonei (McG.).
PLATE 36.—Lepralia vittata (McG.).—Membranipora perforata. Lepralia Brogniartii (Aud.).—L. elegans (McG.).—L. pertusa (Esper. sp.).—L. Malusii (Aud. sp.).—L. lunata (McG.).
PLATE 37.—Lepralia ciliata (Linn. sp.).—L. trifolium (McG.).—L. cheilodon (McG.).—L. canaliculata (McG.).—L. larvalis (McG.).—L. diadema (McG.).—L. papillifera (McG.).—L. Ellerii (McG.).
PLATE 38.—Lepralia monoceros (Busk).—L. excavata (McG.).—L. vitrea (McG.).—L. megasoma (McG.).—L. Schizostoma (McG.).—L. Botryoides (McG.).—L. ferox (McG.).—L. pellucida (McG.).
PLATE 39.—Crisia Edwardsiana (D'Orb. sp.).—C. biciliata (McG.).—C. acropora (Busk).—C. setosa (McG.).—C. tenuis (McG.).
PLATE 40.—Saunders' Case-Moth (Metura elongata, Saunders sp.).
The Lictor Case-Moth (Entometa ignobilis, Walk.).

DECADE V.

PLATE 41.—The Lace Lizard (Hydrosaurus varius, Shaw sp.).
PLATE 42.—The Spotted Marsh-Frog (Limnodynastes Tasmaniensis, Günth.).—The Common Sand-Frog (Limnodynastes dorsalis, Gray).
PLATE 43.—The Carpet Shark (Crossorhinus barbatus, Lin. sp.).—The Seven-gilled Shark (Notidanus [Heptanchus] Indicus, Cuv.).
PLATE 44.—The Barracouta (Thersites atun, Cuv.).—The Tunny (Thynnus Thynnus, Lin. sp.).
PLATE 45.—Flustra denticulata (Busk).—Carbasea episcopalis (Busk).—C. dissimilis (Busk).—C. indivisa (Busk).—C. elegans (Busk).—C. pisciformis (Busk).
PLATE 46.—Spiralaria florea (Busk).—Diachoris Magellanica (Busk).—D. spinigera (P. McGil.).—Dimetopia spicata (Busk).—D. cornuta (Busk).—Didymia simplex (Busk).—Calwellia bicornis (Wyv. Thomson).
PLATE 47.—Dictyopora cellulosa (P. McGil.).
PLATE 48.—Eschara obliqua (P. McGil.).—E. dispar (P. McGil).—E. gracilis (Lamx.).—E. platalea (Busk).—E. quadrata (P. McGil.)—E. mucronata (P. McGil.).—Caleschara denticulata (P. McGil.).
PLATE 49.—Cellaria fistulosa (Linn.).—C. hirsuta (P. McGil.).—C. tenuirostris (Busk.).—C. gracilis (Busk).—Nellia oculata (Busk).—Tubucellaria hirsuta (Busk).
PLATE 50.—The Great Black, or Manna Cicada (Cicada mœrens, Germ.).—The Great Green Cicada (Cyclochila Australasiæ, Donov. sp.).

Natural History of Victoria.

PRODROMUS

OF THE

ZOOLOGY OF VICTORIA;

OR,

FIGURES AND DESCRIPTIONS OF THE LIVING SPECIES OF ALL CLASSES

OF THE

VICTORIAN INDIGENOUS ANIMALS.

DECADE VII.

BY

FREDERICK McCOY, F.R.S.,

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PREFACE.

It having been considered desirable to ascertain accurately the natural productions of the Colony of Victoria, and to publish works descriptive of them, on the plan of those issued by the Governments of the different States of America, investigations were undertaken, by order of the Victorian Government, to determine the Geology, Botany, and Zoology of the Colony, to form collections illustrative of each for the public use, and to make the necessary preparations for such systematic publications on the subject as might be useful and interesting to the general public, and contribute to the advancement of science.

As the geological and botanical investigations have already approached completion, and their publication is far advanced, it has been decided to commence the publication of the third branch completing the subject, namely, that of the Zoology or indigenous members of the different classes of the animal kingdom.

As the Fauna is not so well known as the Flora, it was a necessary preliminary to the publication to have a large number of drawings made, as opportunity arose, from the living or fresh examples of many species of reptiles, fish, and the lower animals, which lose their natural appearance shortly after death, and the true characters of many of which were consequently as yet unknown, as they had only been described from preserved specimens. A Prodromus, or preliminary issue, in the form of Decades, or numbers of ten plates,

each with its complete descriptive letterpress, will be published, of such illustrations as are ready, without systematic order or waiting for the completion of any one branch. The many good observers in the country will thus have the means of accurately identifying various natural objects, their observations on which, if recorded and sent to the National Museum, where the originals of all the figures and descriptions are preserved, will be duly acknowledged, and will materially help in the preparation of the final systematic volume to be published for each class when it approaches completion.

This seventh Decade gives detailed figures and descriptions in the first two plates of those most interesting molluscs, the Argonauts, as represented by one of the species occurring in some summers not uncommonly in our bay, and in which the rare chance of finding the Cuttlefish in its so-called Paper-Nautilus Shell has been taken advantage of to give details which will be welcome to scientific men at home as well as here.

The third plate shows the characters of the new Australian blue-spotted Eagle-Ray, or Sting-Ray, not figured before.

The fourth plate illustrates one of the large and formidable Sharks (*Odontaspis*), the terror of bathers, not uncommon in our bay, and also the new Australian Tope, a smaller Shark, or Dogfish, formerly confounded with the English Tope, and not figured before.

The fifth plate illustrates one of those curious forms intermediate between Pipe-fishes and the Sea-horses, named *Phyllopteryx*, or Leafy Sea-dragons; also our commonest little species of Sea-horse, not figured before.

The next three plates continue the illustrations of our native Polyzoa, for the contribution of which to the National Museum and this work I am indebted to Dr. MacGillivray.

The ninth and tenth plates give figures for the first time of two magnificent new species of those gigantic Insects of the *Phasma* group, in which Australia is so rich, and the resemblance of which,

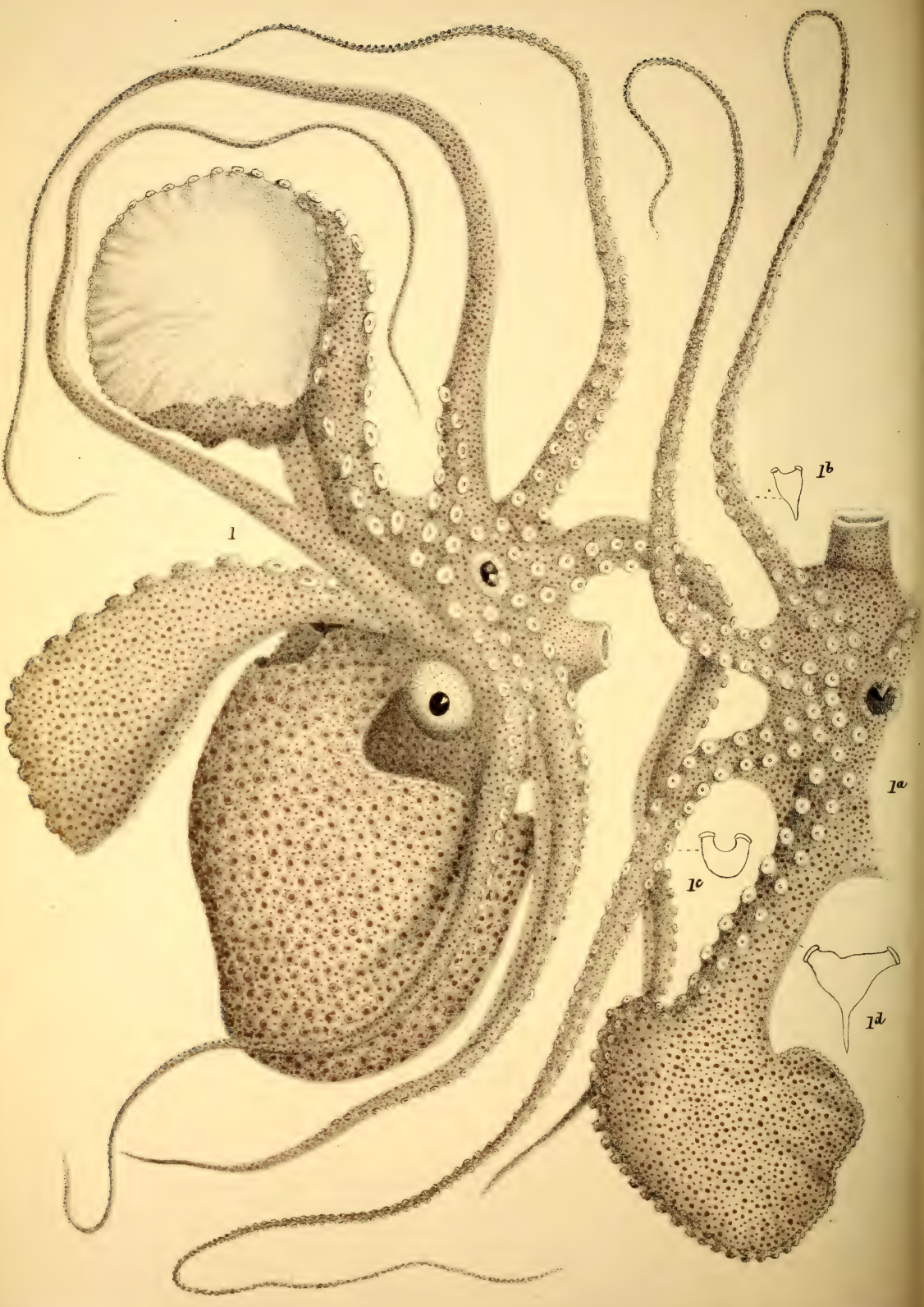
when at rest, to leaves and twigs of the trees they frequent is such a curious subject of speculation.

The succeeding Decades will illustrate as many different genera as possible, and will deal first usually with species of some special interest, and of which good figures do not exist, or are not easily accessible.

FREDERICK McCOY.

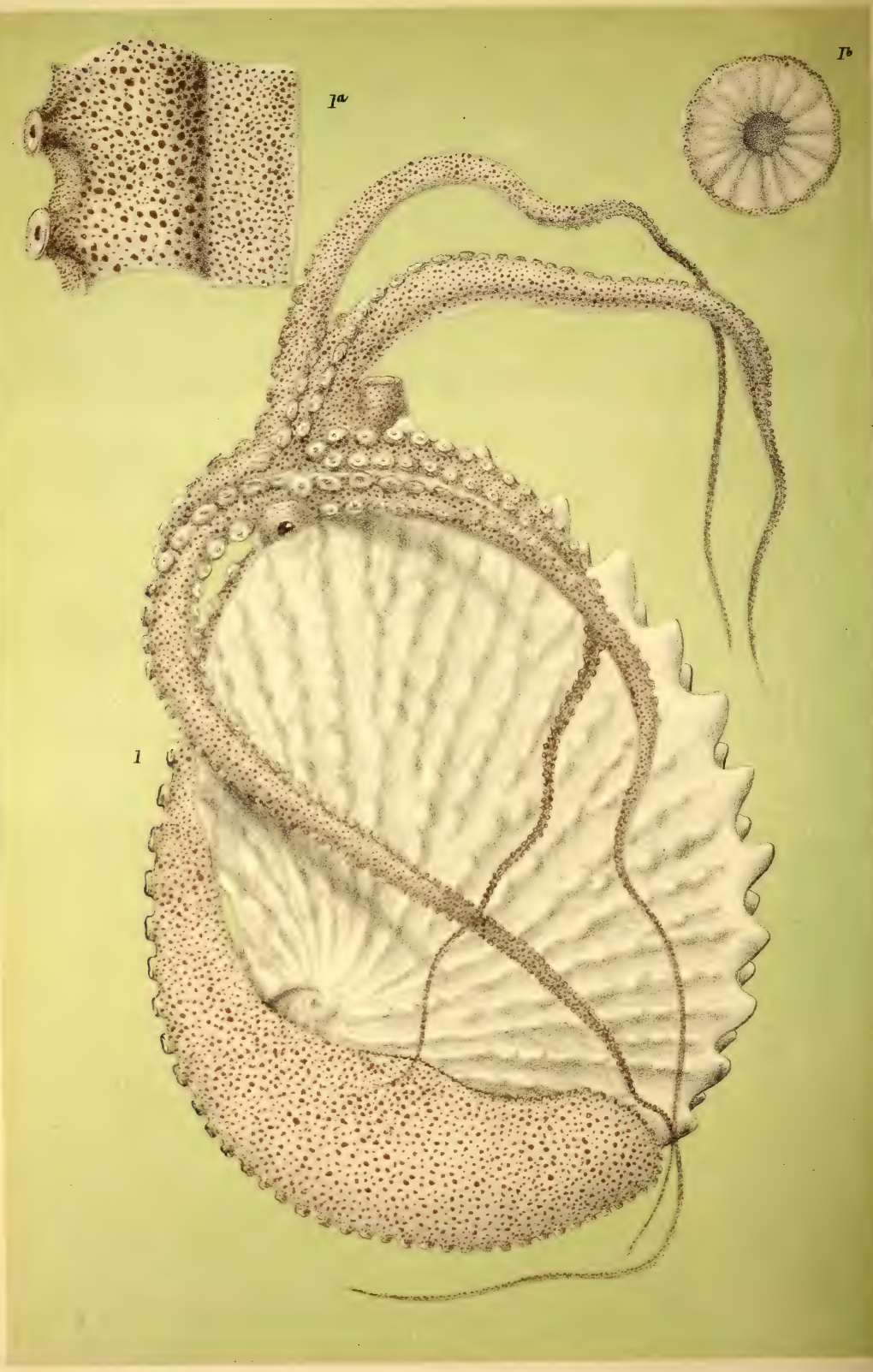
11th November 1881.

P.S.—The recent fire at the Government Printing Office has caused a delay in the issue of this Decade, the revise of which bore the above date, but which is only now published.—F. McC., 12/9/82.



A. Bartholomew del et lith. Prof. Mc Coy direxv Steam litho, Govt. Printing Office.

(Mollusca)



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PLATES 61 AND 62.

ARGONAUTA ORYZATA (MEUSCH.).

THE TUBERCULATED ARGONAUT, OR PAPER-NAUTILUS.

[Genus ARGONAUTA (LIN.) = OCYTHOË (RAFINESQUE). (Sub-kingd. Mollusca. Class Cephalopoda. Order Acetabulifera. Sub-order Octopoda. Family Argonautidæ.)

Gen. Char.—Three anterior or inferior pairs of arms subulate, gradually tapering from base to apex. Superior or posterior pair forming two very broad expansions, by the recurving of the terminal portion backwards in a broad curve, connected by a thick flat expansion with the middle portion; the two rows of suckers, like those of the other arms, bordering the edge. Two rows of large cylindrical or sub-pedunculated suckers on each arm; a broad membranous keel on back of lower and upper pairs of arms; the two middle pairs not keeled. Two aquiferous openings at upper posterior edge of eye. Ears small, behind the eyes, under the cervical band. A projecting button on inside of mantle fits in a groove at base of funnel on each side. Cervical band moderate. Eyes very large, globose, covered by the colored skin of the body, except over the pupil. *Shell* very thin, white, flexible when wet, equilateral, spirally involute in one plane, radiatingly plicated or tuberculated on the flattened sides, with a bicarinate, shallow channel on the narrow periphery; aperture very wide behind, triangular; no chambers or septa. Nucleus very large, hemispherical.]

DESCRIPTION.—*Female:*—body ovoid, convex in front, concave behind, obtusely pointed below. Arms:—three anterior pairs long and slender; 1st longest, 2nd, 3rd, and 4th* successively shorter, measuring from mouth between the rows of suckers to the tip; 1st or posterior dilated pair strongly keeled on back, with a broad membranous web; suckers of outer row longer than those of inner row; 2nd and 3rd pairs of arms not keeled, simply rounded on back†; 4th or anterior pair, with a very prominent membranous keel on back. *Color:* whole skin of surface thin, with close-set minute round spots forming purple circular clusters (about 2 or 3 in a space of 3 lines) as big as a small pin's head, with paler and smaller dots between. Beaks black, not compressed. The inside of the palmated expansion of the 1st or posterior pair of arms is whitish without the chromatic, or color glands, of the general outer surface.

About 80 pairs of suckers on the large palmated arm, but becoming very small and alternate so as to look like one irregular line towards the recurved extremity. About 75 pairs on 2nd arm; about 64 pairs on 3rd arm; about 80 pairs on 4th or anterior arm. The suckers towards the thread-like tip of each arm almost too small to count, but a little over 2 lines in diameter at base, elevated on thick cylindrical peduncles of about the same diameter as the discs. The outer row of suckers on each palmated arm longer than those of inner row, and connected with each other by a slight web; rows on the other arms equal. The anterior (or 4th) pair of arms are connected together at base by a web about 4 lines high crossing over the funnel, and they have an extension of the membranous keel of the outer mid-line, forming at the base a triangular, vertical, suspensory ligament for the funnel on each side.

* Dr. Gray states the order of their length as 1, 2, 4, 3.

† Dr. Gray, in his Cephalopoda Antepedia, page 32, says "the 2nd and 3rd pairs keeled on the outer side," I suppose by mistake, as they are destitute of the prominent keel of the 1st and 4th pairs, and are simply rounded.

There is a transparent web, about 3 lines high, between the base of the 4th and 3rd pair of arms, but none between the bases of the 3rd and 2nd; between the 2nd and 1st or palmated arms the transparent web is about 3 lines high.

Measurements.	Ins.	lines.
Length of body from base of head	3	0
Greatest width, about	2	0
Length of anterior arm	5	9
„ next arm	6	3
„ next arm	8	9
„ sucker line of posterior or palmated arm	10	6
„ posterior arm to distal part of curve	5	7
Width of membranous keel on outside of posterior arm ...	0	3
Depth of arms near base	0	3
Diameter of eye	0	9
Width of cervical ligament	0	7

Shell: moderately compressed; periphery narrow, bituberculate; sides with narrow, transverse, radiating, arched ridges, occasionally branching, and with shorter intercalated ones as they radiate towards the periphery, rising into longitudinal, ovate tubercles, like grains of rice. Antero-posterior diameter of moderate specimen, 5 in. 6 lines; width of periphery from tip of one tuberculated keel to the other, 9 lines; greatest transverse width of aperture (near middle), 2 in. 3 lines; near margin, 5 ridges in space of one inch; 4 tubercles along each ridge in space of one inch.

Reference.—(Shell) = *Argonauta oryzata* (Meusch.) Mus. Geversianum = *A. nodosa* (Solander) Portland Catal. = *A. tuberculata* (Shaw) Nat. Mis. v. 23, t. 995 = *A. tuberculosa* (Schumacher) Lam. Anim. s. Vert. 2nd edit. (Animal) = *Octopus raricyathus* (Blainv.) = *Ocythoë raricyathus* (Gray) Cat. B.M. Ceph. Anteped. Pt. 1, p. 32.

The beautiful objects popularly miscalled Paper-Nautili should not really be compared with true shells, like that of the *Nautilus*, to which the inhabitant is fixed by organic attachments, without tearing which or destroying the life of the Cuttle-fish it would be impossible to separate them. The Argonaut, or Paper-Nautilus, is always excessively thin, white, imperfectly calcified, so as to be slightly flexible when fresh, and totally unconnected with the *Octopus* inhabiting it; so that the so-called shell may be dropped if the Cuttle-fish be frightened, without injuring any of the soft parts of the animal. This want of connection between the Argonaut and its inhabitant was known even to Aristotle. The animal, which was called *Ocythoë* by Rafinesque, inhabiting the Argonaut shell is shaped to fit in the inrolled spire by a peculiarity of form in the body not found in any other of the *Acetabulifera*, namely, the profile of the back being concave, while the front is convex; this recurving of the posterior end according in shape with the cavity of the so-called shell, which is retained in its place by the pair of enlarged, racket-shaped posterior arms bent backwards and closely embracing it.

All the shells, with their inhabitants, are females, and I have not yet succeeded in finding the male ; which in this genus has all the arms tapering, is very much smaller than the female, and without shell. The Mediterranean shelled Argonauts usually have a curious, swollen, detached arm of the male adhering to them, like a parasitic worm, obviously having functions connected with the fertilisation of the eggs, but formed into a supposed genus of parasites, named *Hectocotyle*, by Cuvier ; and these too have escaped notice in the Australian examples.

Like most of the eight-armed Cuttle-fishes, the Argonauts have a short, thick, round body, without fins, and without any internal hard parts, such as the so-called Cuttle-fish bone, or pen, of the higher, ten-armed families. The eyes, as usual in this group, are fixed immovably, and covered by the colored general skin, except in front of the pupil.

No one now believes the old idea that the shell, floating like a boat on the surface of the sea, is rowed along by the dependent slender arms, while the pair of broad arms are held up like sails to propel it by catching a favorable wind, like an ancient galley. The progress through the water is only effected by backward starts, produced by ejecting water violently through the funnel, the 3 anterior pairs of arms streaming out in a group in front, while the shell, covered over by the expansion of the posterior or superior pair, cleaves the water.

Like all the *Octopoda* the Argonauts are generally nocturnal, and inhabit the high seas, feeding on various floating small animals ; rarely coming near the surface by day, except in calm weather. The females only approach the shallow waters of the coast in summer time, when the eggs are developed. It is in the hottest months of summer (January, February, and March), especially in the last few years, that they appear on the shores of Hobson's Bay, near Brighton, where several specimens of the animal and shell together have been obtained. The individual figured was given to me alive by a young friend (who requested that his name should not be mentioned), and was kept alive in a large tub of sea-water for a considerable time. Nothing could be more ludicrously interesting

than the vigilant look-out which the creature maintained, watching suspiciously, with its large perfect eyes just peeping over the edge of the shell in which it nestled, as represented in our plate, with the arms often curled inside along with the body when at rest ; at other times they hung outside or streamed in a close group in front, when the animal and shell darted backwards by shooting water out of the funnel in front of the head. Occasionally it crawled about on the bottom, head downwards, with the shell covering over its upper part. When greatly frightened it abandoned the shell and darted away with great velocity, but got back into it again when left alone. The colors varied in a few seconds from the palest pink to rich madder purple, according apparently to the will or temper of the creature. This coloring of the surface of the body, like naked Cuttle-fishes, is another reason for believing that the shell is not a permanent habitation, but a temporary egg-case ; which, moreover, does not accurately fit the body, as if moulded on it, but is undoubtedly secreted by the inner side of the large expanded posterior pair of arms. For this reason also the greater number of perfect shells found are empty.

The specimens figured are from rocky parts near Brighton, but the so-called shells are found occasionally on all parts of the coast of the colony.

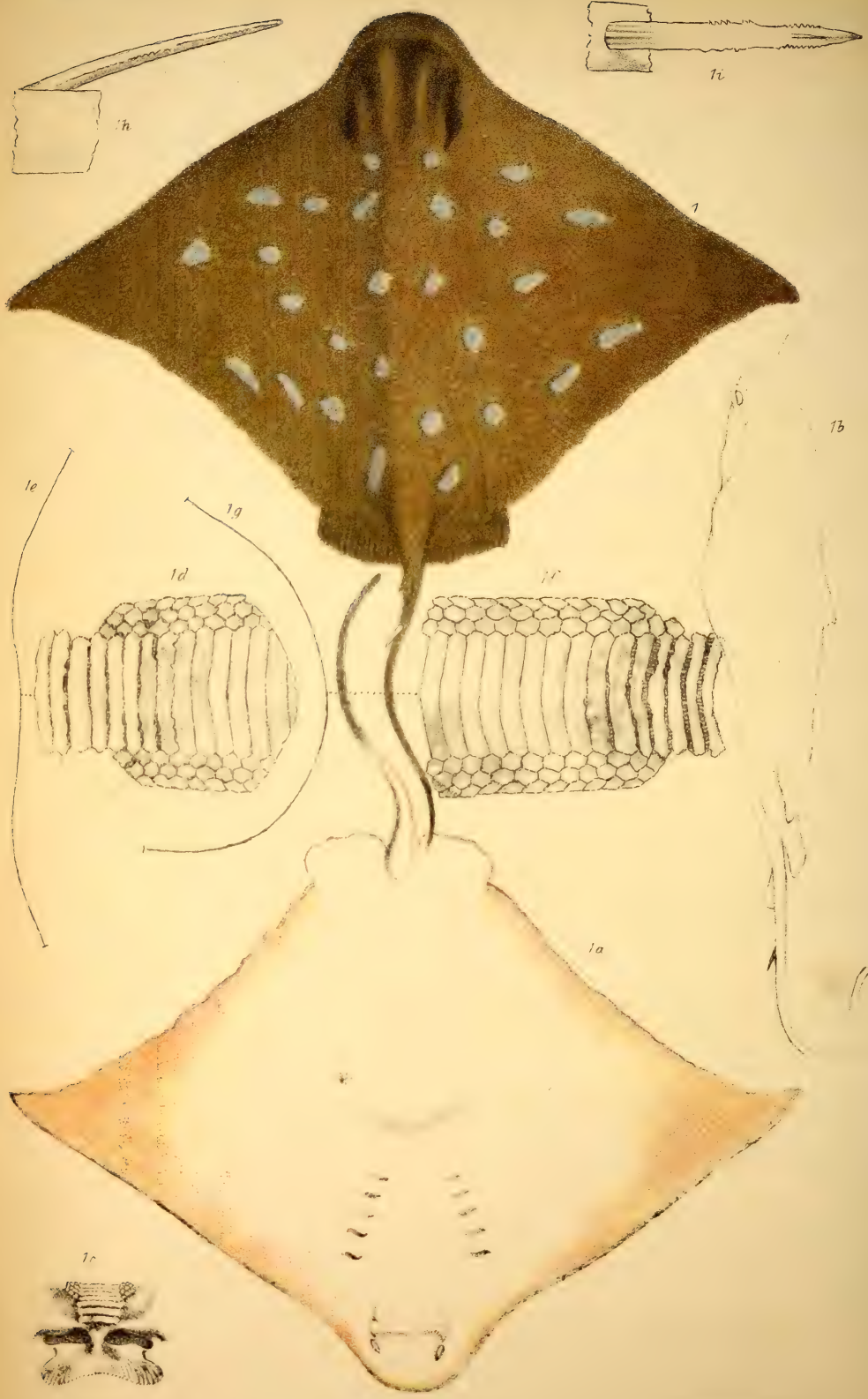
Explanation of Figures.

Plate 61.—Fig. 1, side view of animal, withdrawn from the shell, showing the recurved form of the posterior part of body, the broad nuchal or cervical ligament, the eyes, mouth, beaks, and funnel, with the membranous keels on the anterior pair of slender arms and the broad posterior pair of dilated, shell-bearing ones, natural size. Fig. 1*a*, view of arms of one side of the same, natural size, viewed from above, showing the relative length of the arms, the broad ligamentous web between the anterior pair of arms in front crossing above the funnel, the small webs between the bases of the 1st and 2nd pair and of the 3rd and 4th pairs, and their absence between the bases of the 2nd and 3rd pairs. Fig. 1*b*, section of 1st pair of arms, showing the keel on back. Fig. 1*c*, section showing form of rounded unkeeled back of 2nd and 3rd pairs of arms. Fig. 1*d*, section of hind pair of dilated arms, showing the greater projections of outer row of suckers, and the broad webbed keel on back.

Plate 62.—Fig. 1, animal seated in the shell, embracing and supporting the hinder part with the dilated posterior pair of arms, natural size. Fig. 1*a*, side view of portion of base of posterior arms, showing the broad, membranous keel on back, and the small web between the suckers, magnified. Fig. 1*b*, one of the suckers, viewed from above, showing the retractile centre by which the adhesion to other bodies is caused, magnified.

Frederick McCoy.

Pl. 63



Drawn by A. Bartholomew. Prof. McCoy, direct. F. Sheffield, lith.

Printed by the Steam Press of the Geological Survey Department of the Government Printer, Melbourne

PLATE 63.

MYLIOBATIS AUSTRALIS (MACLEAY).

THE BLUE-SPOTTED EAGLE-RAY.

[Genus MYLIOBATIS (CUV.). (Sub-kingd. Vertebrata. Class Pisces. Order Plagiostomata. Sub-order Batoidei. Family Myliobatidæ.)

Gen. Char.—Head rounded, much elevated, with a flattened, rounded, fleshy expansion in front, distinct from the disc, which is formed by the lateral development of the pectoral fins. Nasal valves coalescing to form a broad, transverse, median, oblong flap, with a concave, fringed, posterior margin. Mouth with rectilinear edges, the lower not extending in front of the upper. Teeth hexagonal, flat, the middle row much wider than long, those of the lateral rows having the length and width nearly equal. Tail long, slender, with a dorsal fin near its base, and a small serrated spine behind the dorsal fin.* Eyes directed laterally, each with a very large spiracle close behind it; no upper eyelid.]

DESCRIPTION.—*Body:* Smooth, rhomboidal; pectoral fins moderately acute and falcate at the tips; anterior edge nearly straight, very slightly convex except near the tip, posterior margin sigmoid, slightly convex near posterior acute angle, and gently concave towards the apex; anterior margin in front of head obtuse, semi-elliptically rounded, the rounded angular junction with the anterior border of the pectoral disc being in about a line connecting the middle of the eyes; an obtuse ridge over each orbit converging to back part of head, leaving a deep concave median hollow. Disc from tip to tip of pectorals less than twice the length to posterior base of ventral fins, more nearly twice from anterior edge of snout to posterior edge of pectoral fin. Ventrals subquadrate. Dorsal fin more than the length of its base behind the posterior root of the ventrals, or its middle about over the posterior edge of the ventrals. Spine a rather less distance behind the posterior edge of dorsal. Tail beyond the spine suddenly reduced in diameter, forming a long slender termination (imperfect in our specimen, and therefore its length cannot be given). *Teeth:* Median teeth of upper jaw $7\frac{1}{2}$ times wider than long (or $7\frac{1}{2}$ in a space equal to the width of one); length and width of the lateral teeth nearly equal. *Color:* Uniform yellowish olive-brown above, with about 26 or 28 large light-blue rounded spots, irregular in shape and distribution, over the disc; underside white in the centre, becoming pinkish-brown and yellowish towards the margins of the pectoral.

Measurements.	Ft.	ins.	lines.
Length from anterior edge of snout to base of tail at posterior root of ventrals	2	5	0
Width from tip to tip of pectorals	4	1	0
Antero-posterior diameter of eyes	0	1	3
„ „ spiracles	0	2	3
Distance between the eyes	0	5	9
Rounded projection in front of head	0	2	0
From tip of snout to posterior base of pectorals	2	1	0
Width of posterior margin of ventrals	0	6	6

* Dr. Günther states that in young individuals the tail is much longer than in old ones, and that the median teeth re regularly hexagonal and of the same size as the lateral ones.

Measurements.	Ft.	ins.	lines.
Length of inner margin	0	3	0
„ outer „	0	5	0
From posterior edge of ventral to anterior edge of dorsal fin	0	2	3
Length of dorsal	0	2	7
Greatest height of dorsal	0	1	0
From posterior edge of dorsal to spine	0	2	0
Length of exposed part of spine	0	1	5
Width at base...	0	0	3
Greatest width of nasal flap	0	4	9
Width of middle and 3 lateral rows of teeth on each side, taken together	0	2	5

REFERENCE.—Macleay, Des. Cat. Aust. Fish, vol. 2, p. 316.

Mr. Macleay has very properly separated this as a distinct species; as it is easily distinguished from the *M. Nieuhofi* by its more obtuse pectorals, less width of disc, and the much greater number of median teeth in a space equal to their width (only 3 or $3\frac{1}{2}$ in *M. Nieuhofi*), more rounded and much shorter muzzle, as well as by the spotted instead of striped disposition of the blue color.

The only specimen I have seen of this species I obtained many years ago at Queenscliff, and presented to the National Museum, no other example having since occurred.

This handsome Eagle-ray has not been figured before.

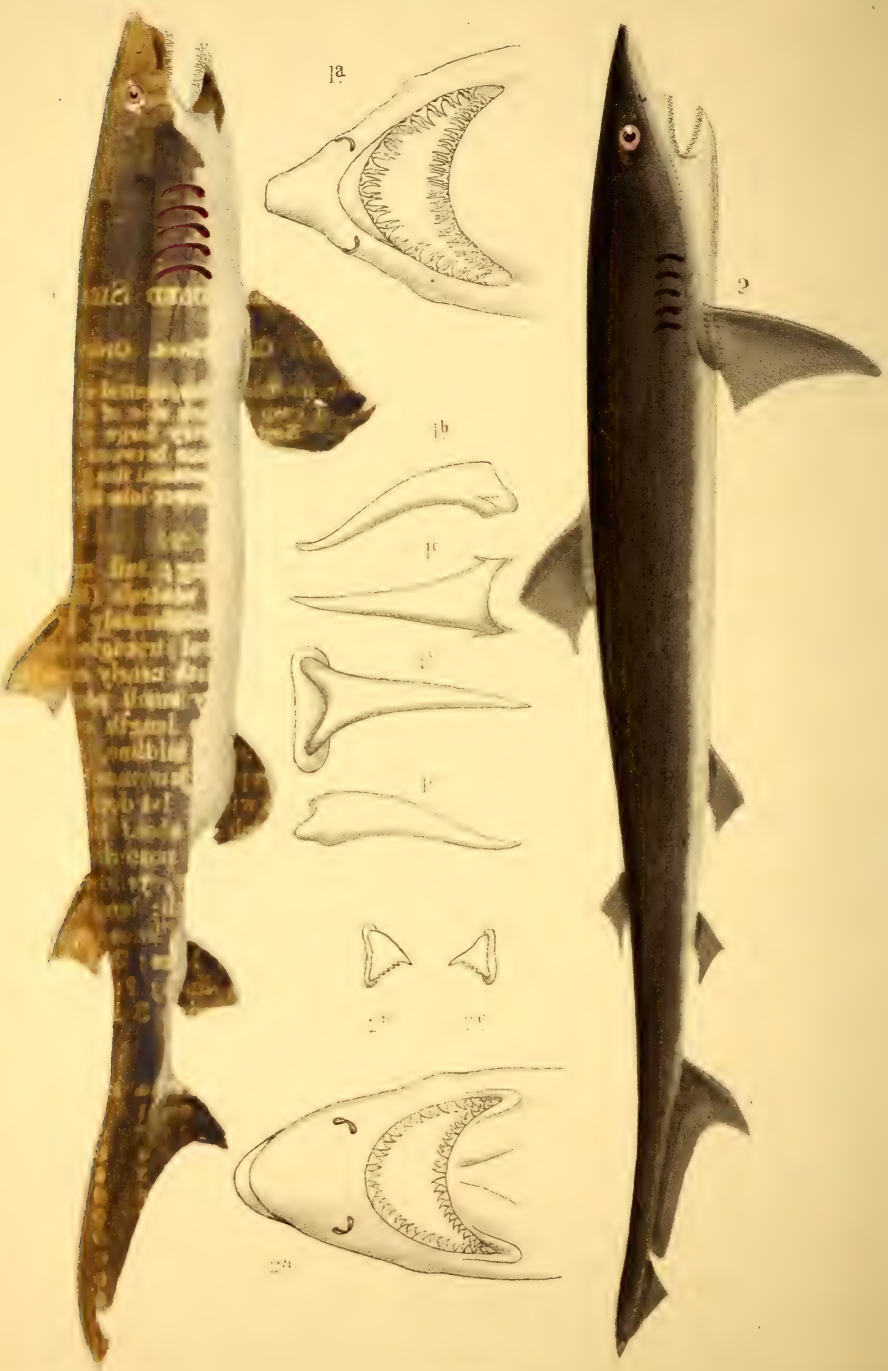
EXPLANATION OF FIGURES.

PLATE 63.—Fig. 1, upper side, one-tenth natural size. Fig. 1*a*, under side, one-tenth natural size. Fig. 1*b*, profile view, one-tenth natural size. Fig. 1*c*, view of nasal flap, nostrils, and teeth of upper jaw. Fig. 1*d*, teeth of lower jaw, one-half the natural size. Fig. 1*e*, flattened antero-posterior surface of dental series. Fig. 1*f*, teeth of upper jaw, half the natural size. Fig. 1*g*, more curved antero-posterior surface of upper dental series. Fig. 1*h*, side view of spine and attached portion of tail, natural size. Fig. 1*i*, dorsal view of spine, natural size.

FREDERICK McCOY.

Pl. 64.

ZOOLOGY OF VICTORIA
(Fishes)



F. Schönfeld lith. *Prof. Mc Coy, direct.* *Hamel & Co imp.*

PLATE 64, FIG. 1.

ODONTASPIS TAURUS (RAFIN.).

THE LONG-TOOTHED BULL-SHARK, OR SHOVEL-NOSED SHARK.

[Genus ODONTASPIS (AGASS.). (Sub-kingd. Vertebrata. Class Pisces. Order Plagiostomata. Sub-order Selachoidæ. Fam. Odontaspidæ.)

Gen. Char.—Teeth alike in both jaws, with smooth margins, triangular, central cusp thick, twisted, very acutely pointed, with a much smaller pointed cusp at each side of the deeply notched base; no median tooth. Spiracles very minute. Nostrils very large with large triangular valve. Second dorsal fin large, in front of anal, over the space between the large anal and the ventral fins. Branchial slits large, all in front of base of pectoral fins. Tail-pits very small or none; no keel on sides of tail. Caudal fin with a small lower lobe and a notch near end of slender upper lobe. No nictitating membrane.]

DESCRIPTION.—General form rounded, moderately tapering; tail moderate. Posterior border of 1st dorsal nearly over the origin of the ventrals (less than one-fourth the length of its base in front). Snout flat, moderately pointed, the portion in front of the eyes forming nearly an equilateral triangle with a transverse line drawn in front of eyes; the part in front of mouth nearly equalling one-half the width of the mouth in length. Spiracle a very small pore about midway between angle of mouth and top of orbit, and half the length of a line connecting them, behind. A moderate tooth on each side of midline, 2nd and 3rd a little larger; 4th and 5th teeth on each side in upper jaw much smaller than the adjoining ones. Pectorals nearly twice as long as wide. 1st dorsal ending over origin of ventrals, little larger than 2nd dorsal, which is about the size of the anal, and terminates nearly over its origin. Scales small, posterior margin rounded, each with three small keels. *Color:* Plain, muddy, yellowish grey above, lighter below; border of fins darker. Upper jaw: 13 teeth; length of 1st, 9 lines; 2nd and 3rd, 8 lines; 4th, 4 lines; 5th, 3 lines; 6th, 7½ lines (gradually diminishing to end). Lower jaw: 17 teeth; length of 1st, 7 lines; 2nd, 1 inch; 3rd, 1 inch 1 line; 4th, 1 inch 1 line; 5th, 6½ lines; 6th, 6½ lines; 7th, 5½ lines (thence regularly diminishing). 14 scales in 3 lines, each with 3 longitudinal keels.

Measurements.	Ft.	ins.	lines.
Length from tip of snout to tip of tail	9	11	0
„ „ „ anterior edge of orbit ...	0	7	0
„ „ „ „ 1st dorsal ...	4	4	6
„ „ „ „ 2nd dorsal ...	6	3	6
„ „ „ „ 1st gill-opening	1	8	0
„ „ „ „ pectoral ...	2	7	0
„ „ „ „ ventral ...	5	4	0
„ „ „ „ anal ...	7	6	0
„ „ „ „ caudal ...	7	11	0
„ „ „ nostril	0	4	0
„ of pectoral	1	4	0
Width of ditto	0	9	9
Length of nostril	0	1	3
Girth of body behind pectorals	4	4	0

Teeth of one side of upper jaw, natural size, to show the 4th and 5th small teeth. The arrow marks the middle of the front.

Measurements.	Ft.	ins.	lines.
Length of base of 1st dorsal	0	6	6
Height of ditto	0	6	3
Length of base of ventral	0	9	0
Height of ditto	0	8	0
Depth of first lobe of caudal fin ...	0	10	0
Length from anterior edge of 1st lobe to notch of caudal	1	10	6
Diameter of eye	0	1	0
Width between middle of eyes	0	7	0
Length from tip of snout to spiracle ...	0	11	0
„ of projection of snout	0	2	0

REFERENCE.—*Carcharius taurus* (Rafinesque), Caratt. p. 10, t. 14., f. 1; *Odontaspis id* (Müller and Henle), Plagiostom. p. 73, t. 30.

This is one of the largest and most ferocious of our Sharks, and so common as to be an object of great terror to bathers, who occasionally suffer grievous lacerations when caught swimming even near the shore, towards which this species approaches into unusually shallow water.

The common name of Shovel-nosed Shark is given by the bay fishermen often to this species from the outline of the head, seen from above, being like the point of an unworn American or paddocking shovel in size and shape.

Enormous jaws of this species may often be seen in the fishermen's huts along the shore from Picnic Point to Mordialloc, and are easily known by the length and slenderness of the teeth, which are very numerous, about an inch long, and set in three or four rows on the under jaw, and two rows on the upper one, making a fearful armature of spikes, the lacerated wound produced by which is almost always fatal. One or two small teeth are remarkable as intervening between the third and fourth large ones on each side.

It is a very active and voracious species, driving shoals of fish before it in terror as it

dashes along; and it is one of those which will occasionally dart out of the water at a piece of meat, or the oar of a boat, or a man's arm or leg.

The great quantity of fish fit for the table devoured by this species induced the Government a few years ago to place large sums on the estimates to prevent its increase, by offering a reward to the fishermen for each one killed according to its size; and for want of authentic figures of the different species to refer to, the authorities were ludicrously imposed upon by the fishermen bringing myriads of the harmless little blunt-toothed Dog-fish and other small species of Sharks, which they gravely presented as the young of this gigantic one, and got paid for, at so much a foot, to the amount of many hundreds of pounds.

Its geographical range is very great, extending to the Cape of Good Hope and to the American coast, where individuals are often found to have remains of men and clothing in them when cut up; and it is the commonest of the large sharks seen swimming round our bathing enclosures in Hobson's Bay.

EXPLANATION OF FIGURES.

PLATE 64.—Fig. 1, side view of female, reduced. Fig. 1*a*, snout and mouth, viewed from below. Fig. 1*b*, side view of tooth, natural size, to show the double curvature. Fig. 1*c*, front view of same, to show basal cusps.

PLATE 64, FIG. 2.

GALEUS AUSTRALIS (MACLEAY).

AUSTRALIAN TOPE SHARK.

[Genus GALEUS (CUV.). (Sub-kingd. Vertebrata. Class Pisces. Order Plagiostomata. Sub-order Selachoidea. Fam. Galeidæ.)

Gen. Char.—Head flattened, muzzle pointed, rounded; eye with nictitating membrane, pupil round above, pointed below; nostrils with small triangular valve; a slit and fold of skin round angle of mouth. Tail moderately short, without pit at the base, or keel on the sides; upper lobe of caudal fin with a notch near tip. Anterior dorsal over interval between pectorals and ventrals, twice the size of second dorsal, which equals the anal in size, and is a little in front of it. Scales minute, with three slight keels. Teeth in both jaws flattened, triangular, notched behind, obliquely inclined backwards and outwards, inner edge smooth, sometimes with one denticle at base, middle cusp acutely angular, pointed, posterior or outer edge denticulated; teeth of middle of front of mouth as large as the lateral ones, but straight, with a denticle at each side of base. Spiracles behind the eye, longitudinal, oval, small. Intestinal valve spiral. Cosmopolitan.]

DESCRIPTION.—Fusiform, slender; snout long, semielliptically rounded; nape of nostril long and slender; teeth, about 19 on each side above and below; central cusp of teeth narrow, pointed, very obliquely inclined, with four to six serratures on posterior base; middle tooth straight, with one small cusp on each side of base. Small specimens have upper teeth less acute, and no serratures on the lower teeth. Second dorsal less than half the size of the first, commencing about one-third of the length of its base in front of front edge of anal; anterior edge of anal nearer to the anterior edge of caudal lobe than to posterior edge of base of ventral; pectorals broad, nearly rectangular at base, narrow towards tip; anterior edge of base vertically under posterior edge of penultimate gill-opening. Scales very minute, 20 in 3 lines about middle of body. Fold at angle of mouth continued above to under middle of eye; a fold on upper eyelid. *Color:* Back and upper half of side slate color; fins darker; lower side of snout, body, and tail white; iris yellow.

Measurements.	Ft.	ins.	lines.
Length from tip of snout to end of tail	5	0	0
„ „ nostril	0	3	3
„ „ front of mouth	0	4	6
„ „ angle of mouth	0	7	0
„ „ front edge of eye	0	5	0
„ „ first gill-opening	0	10	6
„ „ anterior base of pectoral ...	1	1	6
„ „ posterior base of pectoral ...	1	4	0
„ „ anterior base of 1st dorsal ...	1	8	3
„ „ posterior edge of base of 1st dorsal	2	1	0
„ „ anterior base of ventrals ...	2	7	0
„ „ anterior base of 2nd dorsal ...	3	4	0
„ „ anterior base of anal... ...	3	4	7
„ „ anterior base of lower lobe of caudal	3	11	0
„ „ middle of notch of caudal ...	4	5	6
Longitudinal diameter of eye	0	1	3
Posterior edge of eye to spiracle	0	0	10
Length of spiracle	0	0	2
Length of front edge of pectoral	0	8	3
„ hind edge of pectoral	0	2	9
Greatest width of pectoral	0	4	9
Anterior edge of 1st dorsal	0	5	3
Posterior edge of 1st dorsal	0	1	6
Upper margin of 1st dorsal	0	4	6
Length of base of 1st dorsal	0	4	9
Anterior edge of ventral	0	2	6
End margin of ventral	0	2	9
Posterior margin of ventral	0	1	7
Length of base of ventral	0	2	7
Anterior margin of 2nd dorsal	0	1	10
Length of base of 2nd dorsal	0	3	0
Posterior lobe of 2nd dorsal	0	1	5
End margin of 2nd dorsal	0	2	3
Anterior margin of anal	0	1	6
Length of base of anal	0	2	0
Posterior lobe of anal	0	1	3
End margin of anal	0	2	1
Anterior lobe of caudal	0	6	0
Length of caudal	1	0	0
Width of mouth	0	5	0
Length of nostril	0	0	9
Length of middle gill-opening	0	1	6
„ base of upper teeth at middle of jaws	0	0	3½
Height of principal cusp	0	0	3

REFERENCE.—Macleay, Desc. Cat. Aust. Fish, vol. 2, p. 290.

In size, general character, and coloring, this is closely related to the English Tope, *Galeus canis*, in which, as in the present species, I find, on comparing examples of the Australian and English fish, that the two hinder gill-openings are behind the anterior margin of the pectoral. The pectoral is much longer, broader, more falcate, and placed farther back in the English *G. canis* than in the Australian Tope. The 1st dorsal of the Australian fish is more near to the pectoral, and the pectoral and hind lobe of the caudal and the 1st dorsal are smaller, and the 2nd dorsal and anal in the Australian fish are not so close to the caudal ; the caudal being much larger in the English species than in its Australian representative. To render some of these comparative differences more clear, I give the relations in a tabular form of some of the measurements of the two species, taking the total length in each case as 100. The length of B was 5 feet ; it had lower and upper teeth serrated. The smaller male noted below, marked C, was 4 feet 7 in. 9 lines long ; serratures on lower teeth. D, a female, 4 feet 5 in. 6 lines long :—

Proportional Measurements of one English and three Australian Topes.	A.	B.	C.	D.
	English G. canis.	Australian G. Australis.		
	Young Female.	LargeFemale.	Small Male.	Small Female.
Total length from tip of snout to tip of tail ...	100	100	100	100
From tip of snout to anterior base of pectoral ...	27	22	18	17
„ „ posterior base of pectoral...	34	26	23	21
Length of pectoral	19	14	13	12
Greatest width of pectoral	8	7	7	7
From tip of snout to anterior base of 1st dorsal...	35	33	32	33
„ „ hind edge of base of 1st dorsal	41	42	41	42
Anterior edge of 1st dorsal	12	8	9	8
Length of base of 1st dorsal	9	8	8	8
From tip of snout to anterior base of ventrals ...	54	51	51	47
„ „ base of 2nd dorsal ...	62	66	67	68
„ „ base of anal	62	67	71	70
„ „ base of lower lobe of caudal	71	77	81	83
Length of caudal	27	20	17	17

This is a common Dog-fish in Hobson's Bay, usually from four to five feet long, of a graceful tapering form, with a long, semielliptical snout, small fins, except the upper lobe of the caudal, which is large, and with a distinct notch on its under margin. It is one of

those having a transversely moving or winking eyelid, rising over two-thirds of the eye-ball from the inner corner of the oval eye.

The young when brought forth are about 1 foot long, from thirty to fifty being found in a single female. At this size the unabsorbed portion of the egg, 1 inch in diameter, hangs from them. It is a very interesting sight to see, in summer, the whole band of twenty or thirty little ones swimming about after, and generally under the parent, with an obvious display of mutual affection which is not looked for in fish which are not viviparous like this.

Like the English Tope (which has thirty or forty young twice a year), this is a most prolific Dog-fish, and is so abundant and so voracious for its size as to seriously affect the supply of the smaller sorts of fish, and is much hated by the fishermen accordingly. It is exceedingly active, and has the same habit as its European representative of swiftly rolling the line round its body when hooked, coming thus to the surface. It is more frequently caught by persons fishing with a line from the end of the piers for Flat-heads than the latter.

This species has not been figured before.

EXPLANATION OF FIGURES.

PLATE 64.—Fig. 2, profile view of female, reduced. Fig. 2*a*, under side of head to show form of snout, mouth, and nostrils. Fig. 2*b*, upper lateral tooth, natural size (most of the teeth in old specimens have the cusp longer and narrower, with a more marked notch between it and the serrated base than in the figured example). Fig. 2*c*, lower lateral tooth, natural size.

FREDERICK McCOY.

Pl. 65.

ZOOLOGY OF VICTORIA
(Fishes)

Ludwig Becker, del & lith. *Prof. M. Coy, direx.* *Hamel & Co imp.*

PLATE 65, FIG. 1.

PHYLLOPTERYX FOLIATUS (SHAW SP.).

THE LEAFY SEA-DRAGON.

[Genus PHYLLOPTERYX (SWAINSON). (Sub-kingd. Vertebrata. Class Pisces. Order Lophobranchiata. Fam. Syngnathidæ.)

Gen. Char.—Body elongate, fusiform, much compressed, the back convexly arched to opposite anal, and then forming a second dorsal convexity on tail from base of dorsal fin; the belly slightly concave; neck-like, anterior portion long and slender; head with a high compressed occiput suddenly narrowing to the large orbit, beyond which is a long, more slender, tubular snout, with the small jaws at the extremity directed obliquely upwards and forwards; tail long, slender, gradually tapering to a pointed posterior end, which is not prehensile. Pectoral fin short, rounded; anal fin very minute; no caudal fin; dorsal fin moderate. Flat spinulose bones, bearing flat, ovate, leaf-like skinny appendages, arise from occiput nape, a pair from middle of belly, and pairs at intervals on back of tail. Australia.]

DESCRIPTION.—Head about $4\frac{1}{3}$ to $4\frac{3}{4}$ in the total length; from hind edge of operculum to posterior edge of orbit one-fourth the length from hind edge of operculum to tip of snout; height of head at occiput about $3\frac{1}{2}$ in total length of head; depth of tubular snout two-thirds the diameter of orbit; two strong spines diverge upwards, outwards, and backwards from posterior half of upper edge of orbit, and one directed outwards on each side in front of orbit; two minute spines on upper edge of snout, considerably nearer to the eye than the tip, and two slender filaments (often united) on under opposite side. Surface of operculum and preoperculum with fine radiating ridges; pectoral region behind operculum swollen conically, and with a lateral spine on each side and several smaller ones below. Vertical skin-plates, 18 on body and 36 on tail, each with small spinulose tubercles at upper and lower ends, except the upper ends of the 6th to the 17th, which are obtusely rounded and covered with spinous granules; body rings with a nearly median lateral row of small, conical tubercles running into the lower caudal line at origin of tail; a similar median row begins on penultimate body segment, and continues on those of tail rather above the middle to end of dorsal fin, when it forms the upper caudal row. The leaf-bearing long spinulose bones are one short one on occiput, one twice as long on nape, a pair still larger on 11th body ring, and from the 11th, 17th, 23rd, and a single one on the 27th segment of tail; and from the ventral edge of the 9th body segment a short pair with leafy appendages like those above; a much shorter and broader pair without leafy appendages, but ending in several small spines, on dorsal edge of the 1st caudal segment, and a similar pair on abdominal edge of penultimate body segment. *Color:* (of figured specimen) of a greyish orange-fawn color, with minute round yellowish-white spots (most conspicuous on head); head and snout darker. The 9 first body segment have each a broad, vertical, ovate blue patch, extending from above the middle to the ventral edge, the remaining body rings having much smaller ones close to ventral edge; iris silvery-white or yellow; leafy appendages dark olive-brown, with blue patches and reflections. *Fin-rays:* dorsal, 32; anal, 4; pectoral, 21 (the dorsal stands on last body plate, and six first caudal plates). Length, 14 inches; from tip of snout to front edge of orbit, 2 inches 1 line; diameter of orbit, 4 lines; from tip of snout to hind edge of operculum, 3 inches; to middle of base of pectoral, 3 inches 5 lines; to base of tail, 7 inches 7 lines; greatest depth of body, 1 inch 4 lines; greatest depth in front of middle of snout, 2 lines; at base of tail, 8 lines; from tip of snout to origin of dorsal fin, 7 inches 5 lines; length of dorsal, 1 inch 7 lines; greatest length about middle of dorsal, 5 lines.

REFERENCE.—*Syngnathus foliatus* (Shaw), Gen. Zool., vol. 5, t. 180; = *S. tæniolatus* (Lacep.), Ann. du Mus., v. 4, t. 58, f. 3. *Phyllopteryx foliatus* (Swains.), Nat. Hist. Fish., v. 2, p. 332.

This most singular-looking Fish must have struck the aborigines with some superstitious feeling, as I have seen a native drawing of a ghost, manifestly inspired by its strange form. The leafy appendages resemble bits of brown seaweed, and vary slightly, frequently showing a rich blue color. The above dull colors are those I have seen in one living specimen, and several just dead and quite fresh. The brilliantly colored fish represented in the Zoological Proceedings for 1865, plate 14, and in Mrs. Meredith's "Tasmanian Friends and Foes," plate 7, with yellow, crimson, and purple hues, is really a distinct species, for which I propose the name *P. altus*, because the greatest height or depth of the body exceeds the length of the snout from anterior edge of orbit, and equals about ten of the posterior body segments, or mid-row of spines in front of anal, while the greatest depth of the body in our common Victorian dull-colored species, as here figured, and as also in Shaw's original figure of the species, is scarcely $\frac{3}{4}$th the length of the snout, and only measures about 7 of the lateral spines of the hinder body segments in front of the anal.

Like the Pipe-fishes, the males of this fish carry the eggs in a soft membrane on the lower side of the tail, without, however, having a distinct pouch like the males of the true Pipe-fishes. Dr. Kaup, who has carefully examined all the specimens of this fish in the Paris Museum, is able to state that none of these have the snout so short as in Lacepede's figure above quoted, which is therefore simply incorrect in this particular. I do not think the end of the tail is prehensile; at least in newly dead specimens it is not spirally inrolled as in *Hippocampus*.

The Sea-dragons swim horizontally, like ordinary fish, and not in a vertical position, like the Sea-horses.

Common at Western Port, not very uncommon in Hobson's Bay, and Geelong and Portland, from all of which localities specimens are in the National Museum.

EXPLANATION OF FIGURES.

PLATE 65.—Fig. 1, moderate specimen, natural size (tip of tail broken). Fig. 1*a*, jaws at end of snout, magnified $2\frac{1}{2}$ times. Fig. 1*b*, one of ventral bony leaf-bearers, magnified $2\frac{1}{2}$ diameters.

PLATE 65, FIG. 2.

HIPPOCAMPUS BREVICEPS (PETERS).

SHORT-HEADED SEA-HORSE.

[Genus HIPPOCAMPUS (LEACH). (Sub-kingd. Vertebrata. Class Pisces. Order Lophobranchiata. Fam. Syngnathidæ.)

Gen. Char.—Head and body shaped like head and neck of a horse; tail abruptly narrowed, slender, spirally inrolled at tip, prehensile and without caudal fin. Head compressed, broad behind, the upper posterior angle raised with a spinose knob or coronet; orbits large, spiny; snout abruptly narrowed beyond the orbit, with very small, terminal, nearly vertical jaws; body heptagonal, of 10 to 12 bony shields, with spinose tubercles. Pectoral and dorsal fins moderate, anal fin present in female, very small. Males carry the eggs in a pouch at base of tail. All temperate and tropical seas.]

DESCRIPTION.—Head short, snout $1\frac{1}{2}$ times diameter of orbit, or from tip to front edge of orbit equal in length to space from posterior edge of orbit to the hind edge of operculum, or from tip to hind edge of orbit equal to from same point to base of pectoral; spine over each orbit large, triangular, nearly vertical, inclining slightly outward, with a short filament at apex; a filament in front of base of coronet; height of coronet equal depth of middle of snout, or two-thirds the diameter of orbit, having 5 conical tubercles at apex, with small filaments; one large triangular spine on middle of throat vertically under hind edge of orbit, with a smaller one on each side on ridges diverging backwards from it, on lower edge of gill-cover, a little in front of hind edge of operculum; operculum radiatingly ridged. Body rings, 11, the upper tubercles of the 1st, 3rd, and 5th larger and with a filament on each side, the three last elevated into a convex base for dorsal fin; midline of body tubercles (1st, 3rd, 5th, 8th, 9th and 10th, most prominent) continuous with lower ridge of tail; tail quadrangular, of about 39 rings, the 4th, 7th, and 10th more prominent above than the others. Dorsal fin on three last rings of body and between one and two first of tail, of 20 rays; pectoral rounded, of 14 rays, anal in female of 4 rays. *Color:* ashy yellowish-grey, with bluish reflections, minutely dotted with dark-red; body with numerous, minute, dark-edged, round, white spots; operculum and snout spotted with brown, and rays of same color round eye; iris yellow; tail ringed with brown and yellow. Height at penultimate body rings equalling the length of the nine last body rings together. Length, about $2\frac{1}{2}$ inches, of which the tail is one-half.

REFERENCE.—Monatsbericht Akad. Wissensch., Berlin, 1869, p. 710.

The extraordinary resemblance to a horse's head and neck has suggested the popular name of Sea-horse for these beautiful little fishes in all European countries; the common South of Europe species being the Ἱππόκαμπος of Ælian.

They are the most lovely and interesting objects in an aquarium. In swimming they maintain an erect position, very unlike other fish. Fixing themselves to a stem of swaying seaweed by

their inrolled prehensile tails, they maintain an upright watchful attitude, balancing themselves by their pectoral fins, and rolling their bright, prominent, yellow eyes about in all directions, one often directed forwards and the other backwards, like the chameleon.

Like all the family *Syngnathidæ*, or Pipe-fishes, the males carry the eggs about for a period in a sac along the under surface of the tail—a marsupial habit "with a difference," as far as the sex is concerned, of a curiously suggestive kind, as to why the males should not in other creatures have the trouble of protecting the young instead of the almost universal arrangement of leaving it to the females.

This little species is common in Hobson's Bay, but has not been figured before.

EXPLANATION OF FIGURES.

PLATE 65.—Fig. 2, large specimen, natural size. Fig. 2*a*, tip of snout, magnified 3 diameters, to show the little terminal jaws.

FREDERICK McCOY.

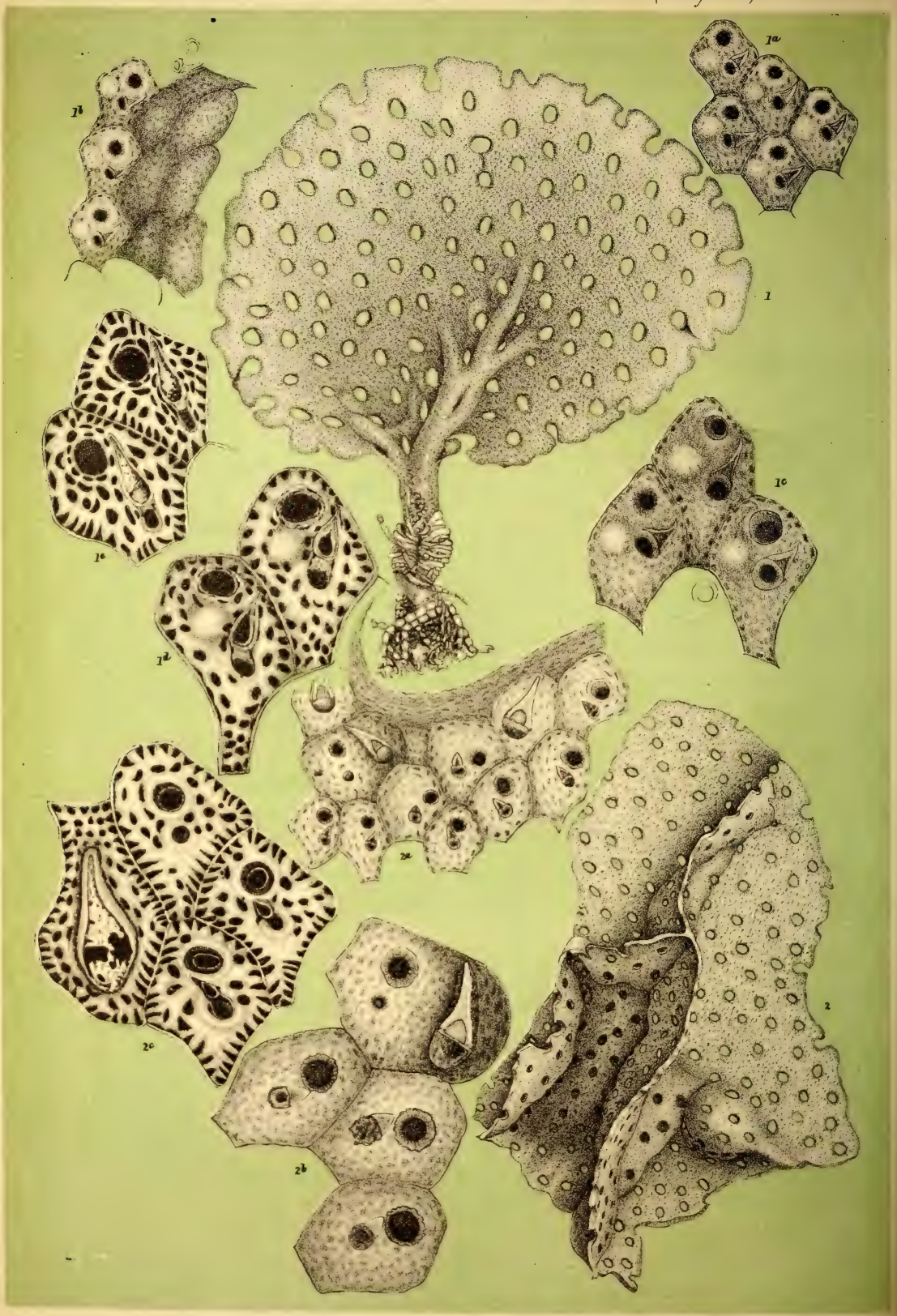

1a
1b
1
1c
1c
1d
2a
2c
2b
2

PLATE 66, FIG. 1.

DICTYOPORA GRISEA (LAMX.).

[Genus DICTYOPORA (P. McG.). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-order Cheilostomata. Fam. Escharidæ.)

Gen. Char.—Polyzoary, stony, expanded, foliaceous, fenestrate, articulated by a flexible stem; cells horizontal, opening on both sides; a special pore on the front of each, close to which is an avicularium.]

DESCRIPTION.—Polyzoary fan-shaped, flat, occasionally proliferous; fenestræ large, nearly circular, the marginal rim divided into distinct pitted nodules; cells rounded above, attenuated below; mouth rather small, circular or nearly so, the margin somewhat thickened; a wart-like projection below and to one side of the mouth; surface, except on the summit of the elevation, pitted; a round pore near the middle of the cell, close to which is an avicularium of moderate size, the triangular mandible turned obliquely outwards to the side opposite the wart-like projection.

REFERENCES.—*Adeona grisea*, Lamouroux, Exposition Methodique, p. 40, t. 70, fig. 5; Kirchenpauer, Ueber die Bryozoen-Gattung Adeona, p. 9, t. I., fig. 8, 8*a*.

Port Phillip Heads.

Of this species I have examined two perfect specimens, the one figured, dredged by Mr. Wilson, and the other by myself, in about 12 fathoms. In both the frond or plate is quite flat, not being twisted or contorted in any way, and extends more to one side of the stem. In the figured specimen it is $3\frac{1}{2}$ by $2\frac{3}{4}$ inches, and in the other 4 by 3. The flexible stem in one is 1 inch by $\frac{3}{8}$ths at the widest part, in the other about $1\frac{1}{2}$ by $\frac{1}{4}$th. In both it terminates in a number of small radicles presenting the same structure as the main stem, by which they are fixed to the calcareous nodules on which they are growing. Raised branching processes or ribs extend for a considerable distance up the plate. The fenestræ are regularly placed, nearly circular or elliptical, 2–3 mm. in diameter, the intervening spaces 3–5 mm. The margins of the fenestræ, as in *D. cellulosa*, are divided into nodules resembling abortive cells.

D. grisea may be distinguished from *D. cellulosa*, to which in the structure of the cells it is closely allied, by the simple flabellate frond (said by Kirchenpauer to be sometimes proliferous), by the avicularium being shorter and directed obliquely across the front

of the cell, not, as in the latter, extending upwards beyond the level of the mouth, and by the wart-like elevation which is especially marked in incinerated specimens.

EXPLANATION OF FIGURES.

Fig. 1, specimen, natural size. Fig. 1*a*, group of cells, magnified. Fig. 1*b*, margin of fenestra, magnified. Fig. 1*c*, three cells, more highly magnified. Fig. 1*d*, two cells, to show the pattern after incineration. Fig. 1*e*, two cells of *D. cellulosa*, similarly treated.

PLATE 66, FIG. 2.

DICTYOPORA ALBIDA (KIRCHENPAUER).

VAR. AVICULARIS (P. MCGIL.).

DESCRIPTION. — Polyzoary expanded, proliferous and cavernous; fenestræ regular, nearly circular, margin forming a continuous punctate rim; cells expanded and arched above, narrowed below, surface pitted, the pits forming a regular row just inside the margin; surface raised round the mouth, which is nearly circular; a round pore a short distance below, to the side of which is frequently attached a minute, triangular avicularium, with the mandible pointed obliquely upwards; several large avicularia, replacing cells, situated round the margins of the fenestræ.

REFERENCE.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1881.

Port Phillip Heads, first found by Mr. J. B. Wilson.

This, I believe, to be a form of Dr. Kirchenpauer's *D. albida*. It attains a very large size, one specimen, dredged in 15 fathoms, measuring over 30 inches in circumference. The plate is proliferous, and united in various ways so as to form chambers or caverns like those of *D. cellulosa*, but usually of larger size. On one specimen a broad, white, irregular rib extends up the plate. The color is ash-grey; the margins of the fenestræ white. The fenestræ are about 2mm in diameter, and the interspaces about 3mm wide. The cells resemble those of *D. Wilsoni*, but they are broader and more regularly trapezoid; the special pore is also smaller, the surface is not so much raised on each side, and the puncturation is deeper and larger. These characters are more prominently shown

in incinerated specimens. It also differs in the cavernous arrangement of the plate, in its lighter color and greater thickness. This and *D. Wilsoni* are at once distinguished from *D. cellulosa* and *grisea* by the small size of the avicularium and the smooth margins of fenestræ.

EXPLANATION OF FIGURES.

FIG. 2,—specimen, natural size. Fig. 2*a*, margin of fenestra and group of cells, with three large cell-replacing avicularia, magnified. Fig. 2*b*, cells from same group, more highly magnified, showing three with avicularia, one with simple pore, and a large cell-replacing avicularium. Fig. 2*c*, group of cells and large avicularium, incinerated.

The specimens were presented by Mr. J. B. Wilson, and the descriptions by Mr. MacGillivray.

FREDERICK MCCOY.

(Polyzoa)

J. Ripper del et lith. Prof. M^c Coy dirext Steam litho. Govt. Printing Office

PLATE 67,

DICTYOPORA WILSONI (P. McGIL.).

DESCRIPTION.—Polyzoary thin, fan-shaped, somewhat contorted, simple or proliferous; fenestræ variable in size, circular or elliptical, the marginal rim nearly plain and not divided into nodules; cells broad and more or less rounded above, much attenuated below; surface obscurely pitted and raised on each side of the avicularian pore (frequently more so on one side) and towards the sides of the mouth; mouth circular or nearly so; about the middle of the cell there is a round pore with a small avicularium (frequently absent) with the triangular mandible directed obliquely upwards.

REFERENCE.—P. H. MacGillivray, Tr. Roy. Soc. Vict., 1881.

Port Phillip Heads, Mr. J. B. Wilson.

I have only seen one specimen of this species. It consists of a tuft of four separate plates, the stems arising from the same basis. The plates are thin, fan-shaped, somewhat contorted, about 4 inches high and the broadest about the same width. The separate flexible stems are up to 1 inch long, and from $\frac{1}{8}$ to a $\frac{1}{4}$ inch wide. To one of the plates there is a secondary plate attached at an acute angle, and in another there are several plates so arranged as to form two compartments, one very small, the other 2 inches deep, $\frac{1}{2}$ inch wide in one direction and $1\frac{1}{4}$ in the other at the orifice. In all, slightly raised ridges extend, dividing from the stem to a variable distance up the plate. The fenestræ are from 1 to 3 mm wide, the intervening spaces, about 4 mm. The cells resemble those of Kirchenpauer's *Adeona arborescens*, which I have not seen. That species, however, seems to be sufficiently distinguished by the thick, prominent ridges or ribs which extend regularly for a long distance on the plate, while in *D. Wilsoni* they are short and very slightly elevated.

EXPLANATION OF FIGURES.

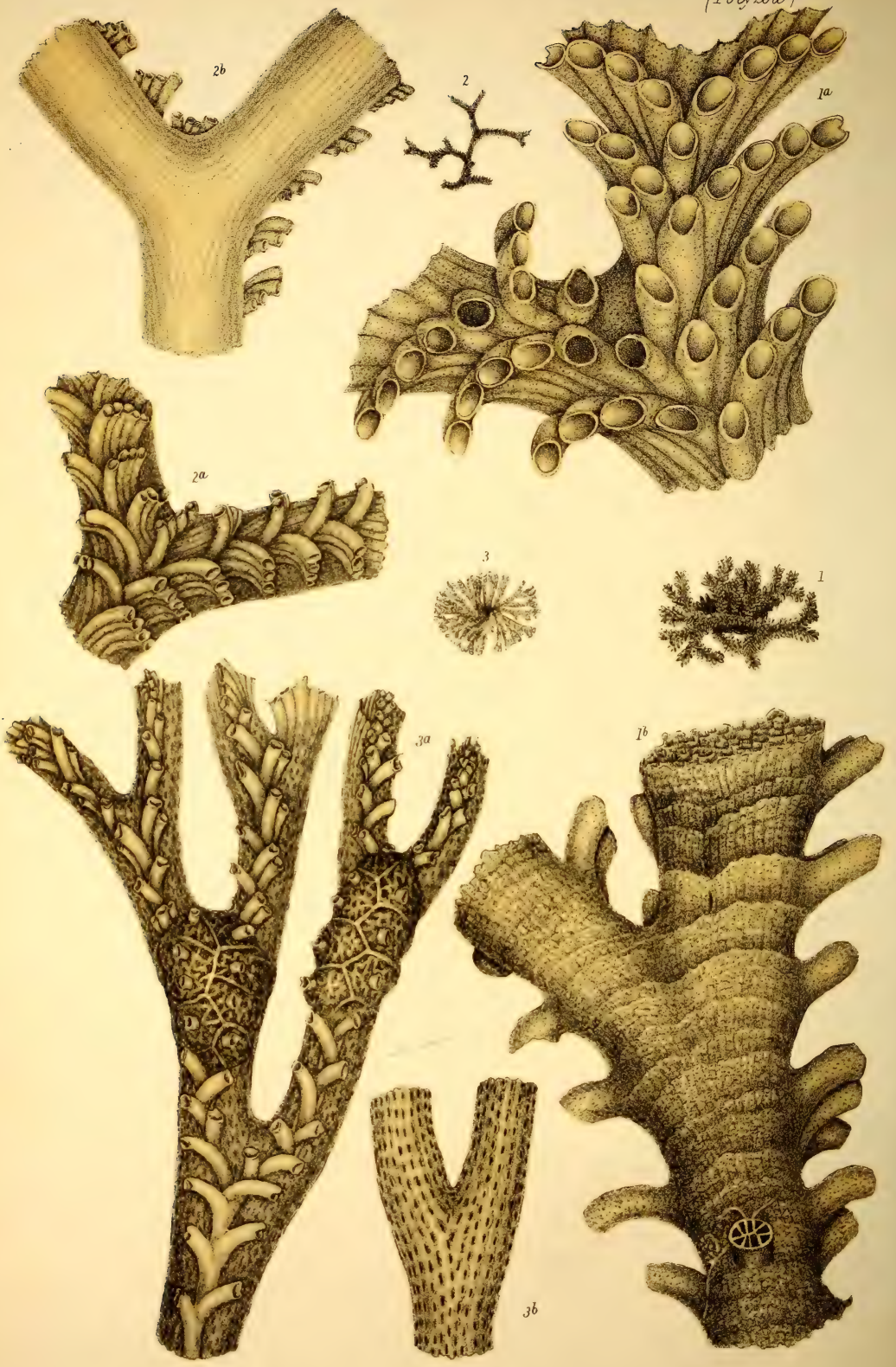
PLATE 67.—Fig. 1, specimen, natural size. Fig. 1*a*, margin of fenestra, with contiguous cells, magnified. Fig. 1*b*, three cells, more highly magnified. Fig. 1*c*, group of cells incinerated.

The figured specimens of *Dictyopora* were presented by Mr. J. Bracebridge Wilson; for the description I am indebted to Mr. MacGillivray.

FREDERICK McCOY.

ZOOLOGY OF VICTORIA

(Polyzoa.)



J. Ripper del. et lith. Prof. M^c Coy direx^t Steam litho. Govt. Printing Office.

PLATE 68, FIG. 1.

IDMONEA MILNEANA (D'ORBIGNY).

[Genus IDMONEA (LAMX.). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-order Cyclostomata. Fam. Idmoneidæ.)
Gen. Char.—Polyzoary erect, branched. Cells tubular, arranged in parallel transverse or oblique rows on each side of the mesial line of the front of the branches.]

DESCRIPTION.—Polyzoary spreading more or less horizontally, branches broad, flat, dividing dichotomously ; cells usually four in a series, the outer the longest, surface closely punctate ; back of branches longitudinally grooved, finely punctate or perforated, and marked with transverse concentric ridges of growth.
REFERENCE.—Busk, Brit. Mus. Cat., pt. iii., p. 12, Plate xi.

Port Phillip Heads, 10–15 fathoms.

The largest specimen I have seen is the one figured. The polyzoary is green, 1 inch in one diameter by $\frac{3}{4}$ in the other. It springs from the surface of a Retepora and immediately branches horizontally and dichotomously. These branches send down from the back numerous calcareous radiciform processes which become attached to the Retepore. The branches are broad and flat behind. The cells are usually four in a series, the inner the least prominent, the others gradually increasing in length to the outer which projects very much. They are united side to side throughout almost their whole length, so as to form regular walls rising up and projecting far beyond the edges of the branches. They are distinct on the front of the branches and are minutely and closely punctate. The back of the branches is longitudinally sulcate, thickly covered with punctations which are usually opened and form small pores, and it is closely marked by nearly transverse, arched, concentric lines of growth. From various parts of the back of the branches calcareous radiciform processes project downwards, and are united to the body from which it grows ; these processes are sulcate and punctate, and in section are seen to be composed of a number of prismatic tubes.

EXPLANATION OF FIGURES.

PLATE 68.—Fig. 1, specimen, natural size. Fig. 1*a*, portion of front of same, magnified. Fig. 1*b*, portion of back, magnified, showing the longitudinal sulci, punctations, and transverse ridges.

PLATE 68, FIG. 2.

IDMONEA AUSTRALIS (P. McGIL.).

DESCRIPTION.—Polyzoary dichotomously branched, branches spreading irregularly, contorted, and twisted on themselves ; 4–6 cells in a series, the inner the longest, surface punctate ; back of branches longitudinally sulcate, the intervening ridges punctate.

Port Phillip Heads, 10–15 fathoms.

The only specimen I have with a distinct point of attachment is $\frac{1}{2}$ inch high by $\frac{3}{4}$ across. Numerous others, evidently broken off close to their origin, are about the same size. The polyzoary is of a dirty-white color, dichotomously irregularly branched ; the branches angular in front, slender, frequently spreading in various directions and slightly twisted on themselves, occasionally a third of a revolution or even more. There are about 4–6 cells in a series, the inner the longest, the outer little projecting. The surface is finely punctured and obscurely granular. The back of the branches is rounded, deeply sulcate longitudinally, the ridges between the sulci punctate.

This species may prove to be a form of *I. Atlantica*, but at present I think it better to describe it as a distinct species.

EXPLANATION OF FIGURES.

PLATE 86.—Fig. 2, specimen, natural size. Fig. 2*a*, front of a branch, magnified. Fig. 2*b*, back, magnified.

PLATE 68, FIG. 3.

IDMONEA RADIANS (LAMK.).

DESCRIPTION.—Polyzoary rising from a narrow base ; branches narrow in front, dichotomous, spreading in a radiating manner ; cells 1–4 in a series, the inner very much projecting, smooth, mouth bilabiate ; back of branches ridged longitudinally, with the intervening sulci pierced by a single row of round or oval pores ; ovicells anterior, situated immediately below a bifurcation, and embracing the cells on both sides for about 5 series, divided by elevated ridges, and with the intermediate surface pitted.

REFERENCE.—Busk, Brit. Mus. Cat., pt. iii., p. 11., pl. vii., fig. 1–4.

Williamstown ; Queenscliffe ; Portland, Mr. Maplestone.

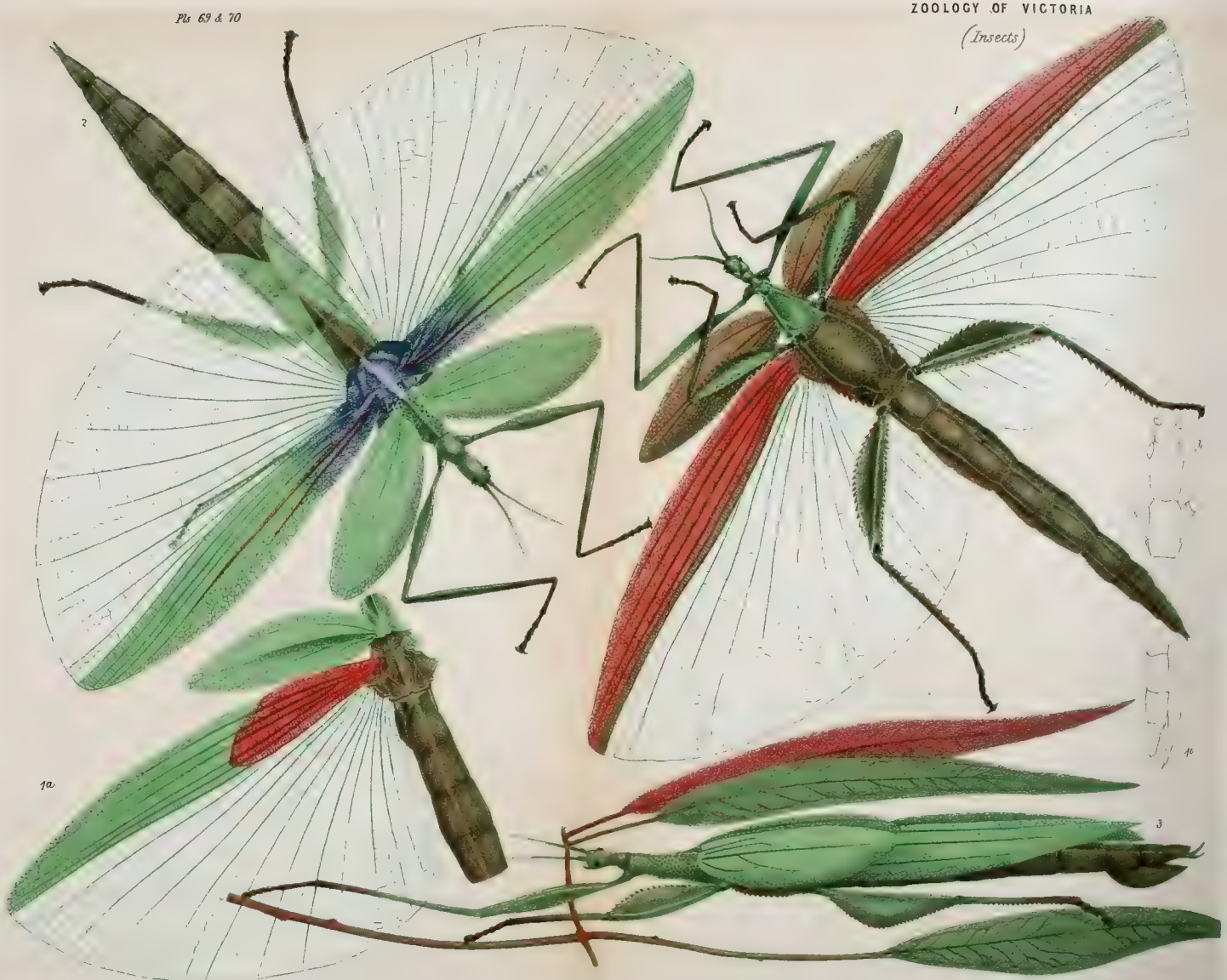
This beautiful species forms small masses up to $\frac{3}{4}$ inch in diameter. It is fixed to narrow algæ and other zoophytes by a small calcareous attachment usually encircling the stem. There are generally several primary branches which at once divide dichotomously and more or less horizontally, the bifurcations being repeated three or four times. The divisions of each primary branch are arranged in a fan-shape, and in fine specimens the whole polyzoary assumes a nearly circular outline. The branches are much narrowed in front, the proximal parts of the cells forming a prominent ridge. The number of cells in a series varies from 1 to 4. When more than one, the inner is very much longer, and when viewed in front may obscure the others (as in the figure). The mouth, in perfect specimens, is usually bilabiate. The back of the branches is deeply sulcate longitudinally, the spaces between the sulci forming continuous, rounded, smooth ridges. In the sulci there is a single series of roundish or oval foramina, placed at short distances and regular intervals. The ovicells are situated on the front of a branch immediately below a bifurcation. They are very large, embracing the cells of 4 or 5 series on each side, project forwards, and are traversed by reticulating slightly elevated ridges, the surface between which is deeply pitted.

Explanation of Figures.

Plate 68.—Fig. 3, specimen, natural size. Fig. 3*a*, front of portion magnified, showing also two ovicells. Fig. 3*b*, portion of back, magnified.

Mr. MacGillivray has presented all the type specimens figured on this plate, and the descriptions for the Museum and this work.

Frederick McCoy.



A. Bartholomew. del. et lith.

Prof. McCoy. direx.

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PLATES 69 AND 70, FIGS. 2 AND 3.

TROPIDODERUS IODOMUS (McCOY).

THE VIOLET-SHOULDERED PHASMA.

[Genus TROPIDODERUS (G. GRAY). (Sub-kingd. Articulata. Class Insecta. Order Orthoptera. Sec. Ambulatoria. Fam. Phasmidæ.)

Gen. Char.—Body large. Head flat, oblong, and subconvex behind in female. No ocelli. Antennæ 24-jointed and as long as entire thorax in males; 26-jointed and about as long as the mesothorax in female. Mesothorax in male slender, cylindrical, more than twice as long as prothorax, sides finely serrated; in females about twice as long as prothorax, subtriangular, keeled along the middle, sides sloping downwards and outwards to a prominent, flat, serrated margin; mesothorax similarly keeled in middle, and serrated at sides. Tegmina elongate, ovate, extending nearly to middle of first segment of abdomen in male, to middle of abdomen in female; median carina, moderately elevated in both sexes. Wings very large in both sexes, reaching nearly to end of abdomen, those of males narrower. Legs short; simple; basal joint of all the tarsi short; four posterior femora in male slender, strongly serrated on all the angles; in the female the fore margin dilated and dentated. Abdomen of male slender, cylindrical; of females broad, gradually tapering to tip; ovipositor large, boat-shaped, extending slightly beyond abdomen; anal styles are moderately long in both sexes.]

DESCRIPTION.—Female: *Color:* Tegmina and costal area of under wings bright pea-green above and below, except the base of the under-wings which are rich intense violet on upper and under sides; sides and lower surface of abdomen, head, thorax above and below, and femora a slightly duller green; tibiæ and tarsi and anal styles brownish; upper surface of abdomen pale-greenish yellow; veins of posterior part of lower wings pale-green; the hyaline membrane nearly colorless, or with a slight greenish hue. Serratures of sides of thorax and femora of two hinder pairs of legs reddish. Prothorax and mesothorax closely and irregularly granular above, the metathorax granulated like the others below, as well as lower side of abdomen; antennæ equalling the prothorax and mesothorax in length. Length from 4 inches 9 lines to 5 inches 3 lines: proportional measurements to length, taken as 100, length of head, $\frac{7}{100}$; of antennæ, $\frac{16}{100}$; of prothorax, $\frac{6}{100}$; mesothorax, $\frac{11}{100}$; metathorax, $\frac{16}{100}$; abdomen, $\frac{60}{100}$; width, $\frac{13}{100}$; ovipositor, $\frac{20}{100}$; anal styles, $\frac{5}{100}$; length of tegmina, $\frac{35}{100}$; width of tegmina, $\frac{12}{100}$; length of wing, $\frac{72}{100}$; greatest width of wing, $\frac{45}{100}$; width of costal area, $\frac{11}{100}$; length of anterior femora, $\frac{25}{100}$; width, $\frac{3}{100}$; length of 2nd femora, $\frac{19}{100}$; width, $\frac{5}{100}$; length of hind femora, $\frac{20}{100}$, width, $\frac{6}{100}$.

This splendid Phasma is an example of the gigantic insects peculiar to Australasia constituting the genus *Tropidoderus*, and it is a good type of the whole family of the *Phasmidæ*, popularly called Spectres, Walking-sticks, and Walking-leaf Insects, from so closely resembling twigs and foliage of plants frequented by them.

The 5-jointed tarsi, the longitudinally folded wings, and no pincer at end of abdomen, separate the *Phasmidæ* from the Earwigs (*Forficulidæ*); the small prothorax, from Cockroaches (*Blattidæ*); the simple fore legs, from the raptorial *Mantidæ;* and the hind

legs not being thickened for leaping, from the saltatory Grasshoppers and Locusts (*Locustidæ*), the Crickets (*Achetidæ*) and *Gryllidæ*.

They are confined to warm latitudes ; the Indian Archipelago being their great centre. They are all harmless, plant-eating creatures. The males are smaller, and with longer and more slender legs and antennæ than the females. In some the males have large wings, and the females only imperfectly developed ones or none, while in others both sexes have fully-developed wings, and in many others the adults of both sexes are apterous. The legs when lost are gradually restored in successive moults ; but these renewed legs are generally smaller than before, and may be recognised by this difference from the corresponding one on the other side. The relative proportion of different parts of the legs and parts of the thorax afford specific characters; and the three terminal segments of the abdomen containing genital parts are also used for discriminating species. In the male the three last joints on the ventral side are smaller than the rest, and swollen ; in the females the 7th on the under side forms a boat-shaped ovipositor or operculum protecting the genital appendages of the two terminal joints, sometimes forming long, exserted styles or plates. In both sexes the under-side of the ninth dorsal segment has two, generally filiform, very short, setose styles, greatly developed in the Australian species into two long flattend appendages. The relative size of the two divisions of the metathorax above affords specific characters.

The family *Phasmidæ* is divided into the following sections, which are only temporary, as *Bacillæ* of the 1st may hereafter be found to have winged males. A difficulty also arises in the immature stages of development of the tegmina and wings of species, having them large when adult. The texture sometimes enabling one to distinguish small wings in adults, from immature small stage of large-winged species. The main vein of the costal area of the wing is simple in the male and forked in the female, or forked in both sexes. The ocelli are not even of sexual importance, some individuals having three, and others of the same sex and species not having any.

§ 1. *Apterophasmina.* Tegmina and wings absent in adults of both sexes.

§ 2. *Pterophasmina.* Tegmina and wings developed in both sexes, or in males only. Tegmina (except in *Phyllium*) too small to cover the wings, the anterior costal area of which is hard coriaceus, thick and colored, and with parallel, immovable veins, the hinder membranous part of the wing folding up longitudinally under it when at rest, from its movable radiating veins.

This beautiful species differs from *T. Childreni* in the less width of the tegmina, and the longitudinal veins in front of the median one being so small as scarcely to strike the eye, and in the less width of the costal area, and of the dilated middle of posterior femora.

One of the specimens figured was presented to the Museum by Prof. Halford, from Beaconsfield, on the Dandenong Range, the others are from near Melbourne. Although varying half an inch in absolute size, the proportional measurements given above are the same in all.

EXPLANATION OF FIGURES.

PLATES 69 & 70.—Fig. 2, female with wings extended, natural size. Fig. 3, another specimen with wings closed, in the resting position, on a twig of *Eucalyptus*, to show the resemblance between the leaves and the hard parts of the wings when at rest.

PLATES 69–70, FIG. 1.

TROPIDODERUS RHODOMUS (McCOY).

THE RED-SHOULDERED PHASMA.

DESCRIPTION.—General form of *T. iodomus* but with longer wings, and with broader tegmina, having the veins on the anterior half or side of the mid-line nearly as strong as those below or on posterior side of it; and the antennæ are much shorter and thicker; and the serrated dilations of the two hinder pairs of femora are much wider. *Color:* head, thorax, tegmina, femora and distal $\frac{3}{5}$ths of costal area, above, bright pea-green; basal $\frac{2}{5}$ths of costal area scarlet vermilion; hyaline wings pale-green with stronger green veins; whole of under side of costal area scarlet vermilion with pale-green veins; tibiæ and tarsi brownish; upper surface of abdomen yellowish; sides and ovipositor green. Length from anterior part of

head to end of abdomen 5 inches 2 lines. Proportional measurements in fractions of the length, taken as 100: length of head, $\frac{5}{100}$; of antennæ, $\frac{12}{100}$; of prothorax, $\frac{5}{100}$; of mesothorax, $\frac{8}{100}$; of metathorax, $\frac{20}{100}$; of abdomen, $\frac{66}{100}$; of ovipositor, $\frac{18}{100}$; of anal styles, $\frac{3}{100}$; of tegmina, $\frac{34}{100}$; width of tegmina, $\frac{11}{100}$; length of costal area of wing, $\frac{77}{100}$; width of costal area, $\frac{11}{100}$; width of wing, $\frac{43}{100}$; length of anterior femora, $\frac{25}{100}$; width of femora, $\frac{2}{100}$; length of 2nd pair of femora, $\frac{20}{100}$; width, $\frac{5}{100}$: length of hind femora, $\frac{24}{100}$; width, $\frac{6}{100}$.

This is apparently the insect referred to by Prof. Westwood (Cat. Orth. In., p. 166) as the Adelaide variety of *T. Childreni* with rose-color under side of costal area and tegmina and basal portion of costal area above, and showing as a variability a greater expanse of wing. I do not find any perceptible or important variation; and therefore the wings are longer and less broad than in that species, the antennæ are shorter, and the perfectly constant, vermilion scarlet of the upper half of the costal area, and the under-side of the tegmina and costal area being of the same striking red, contrasts strongly with the green under-side of the tegmina and costal area and purple base of the wings of *T. Childreni.* The present species is distinguished from the *T. iodomus* by the red instead of violet base of wing above, and the splendid scarlet vermilion of the under-side of nearly the whole of the costal area and tegmina; it likewise differs in the much stronger veins above and below the mid-vein of the tegmina, the much shorter antennæ, and the wider, dilated femora of the 2nd and 3rd pairs of legs.

When seen flying against the sun, the red of the under-side of the costal area of the wings overpowers the green of the distal portion of the upper surface, shining through, so as to appear of strikingly vivid scarlet vermilion, which disappears like magic when the creature alights, suddenly folds its great wings in a narrow green layer over the abdomen concealed by the costal area, the red base of which is exactly covered over and hid by the green tegmina, so that the whole agrees so nearly with the foliage of the *Eucalypti* on which it rests that the sharpest eye would miss it, especially if looking for the splendid scarlet flying creature of an instant before.

I might mention that the whitish and yellowish head, thorax, veins, and patches on the tegmina and the costal area seen in cabinet specimens of this and many described allied kinds of green Phasma are only *post mortem* bleachings, arising from the moisture

of slightly decomposing soft parts, and in the living insects are leaf-green like the other green parts.

A rare species, occurring in the warmer northern parts of Victoria. The specimen figured is from Inglewood, and was procured for the National Museum from Mr. Plant, who found it.

Explanation of Figures.

Plates 69 & 70.—Fig. 1, female, with wings extended as in flight, natural size, seen from below, to show the great extent of the scarlet on the under-side. Fig. 1*a*, upper surface of same specimen, to show the small extent of the red capable of being entirely covered and concealed by the upper tegmina when at rest. Fig. 1*b*, head, prothorax, and base of antennæ, magnified. Fig. 1*c*, terminal joints of body, showing styles and ovipositor, magnified.

Frederick McCoy.

By Authority: John Ferres, Government Printer.

CONTENTS OF DECADES.

N.B.—The originals of all the Figures are in the National Museum, Melbourne.

DECADE I.

PLATE 1.—The Black Snake (Pseudechys porphyriacus, Shaw sp.).
PLATE 2.—The Copper-head Snake (Hoplocephalus superbus, Günth.).
PLATE 3.—The Tiger Snake (Hoplocephalus curtus, Schl. sp.).
PLATE 4.—The Australian Bream (Chrysophrys Australis, Günth.).
PLATE 5.—The Spiny-sided Butterfly-Gurnard (Lepidotrigla Vanessa, Rich. sp.).
PLATE 6.—The Kumu Gurnard (Trigla Kumu, Lesson and Garn.).
PLATE 7.—The Australian Giant Earth-worm (Megascolides Australis, McCoy).
PLATE 8.—Lewin's Day-moth (Agarista Lewini, Boisd.).
The Loranthus Day-moth (Agarista Casuarinæ, Scott).
The Vine Day-moth (Agarista Glycine, Lewin sp.).
PLATE 9.—Pieris (Thyca) Harpalyce (Don. sp.).
PLATE 10.—Pieris (Thyca) Aganippe (Don. sp.).

DECADE II.

PLATE 11.—The Little Whip Snake (Hoplocephalus flagellum, McCoy). The White-lipped Snake (Hoplocephalus coronoides, Günth.).
PLATE 12.—The Death Adder (Acanthophis Antarctica, Shaw sp.).
PLATE 13.—The Carpet Snake (Morelia variegata, Gray).
PLATE 14.—The Gippsland Perch (Lates colonorum, Günth.).
PLATE 15.—The Murray Lobster (Astacoides serratus, Shaw sp.).
PLATE 16.—The Salmon Arripis (Arripis truttaceus, Cuv. sp.). Adult.
PLATE 17.—Ditto of the younger forms and coloring.
PLATE 18.—The Horse Mackerel (Trachurus trachurus, Lin. sp.).
PLATE 19.—The Small-scaled Rock Cod (Lotella callarias, Günth.).
PLATE 20.—The Australian Rock Cod (Pseudophysis barbatus, Günth.).

DECADE III.

PLATE 21.—The Sea-Leopard Seal (Stenorhynchus leptonyx, de Blainv. sp.).
PLATE 22.—The Yellow-sided Dolphin (Delphinus Novæ Zealandiæ, Quoy and Gaim.).
PLATE 23.—The Common Brown Snake (Diemenia superciliosa, Fisch.).
The Small-scaled Brown Snake (Diemenia microlepidota, McCoy).
The Shield-fronted Brown Snake (Diemenia aspidorhyncha, McCoy).
PLATE 24.—Catenicella margaritacea (Busk).—C. plagiostoma (Busk).—C. ventricosa (Busk).—C. hastata (Busk.)—C. rufa (McG.).—C. cribraria (Busk).—C. alata (Wyv. Thomson).—C. lorica (Busk).—C. formosa (Busk).—C. elegans (Busk).—C. perforata (Busk).—C. Buskii (Wyv. Thomson).—C. Hannafordi (McG.).—C. crystallina (Wyv. Thomson).—C. carinata (Busk).—C. aurita (Busk).—C. geminata (Wyv. Thomson).—C. cornuta (Busk).—C. intermedia (McG.)
PLATE 25.—Membranipora membranacea (Linn. sp.).—M. perforata (McG.).—M. ciliata (McG.).—M. mamillaris (McG.).—M. umbonata (Busk).—M. pilosa (Linn. sp.).—M. cervicornis (Busk).
PLATE 26.—Membranipora dispar (McG.).—M. Woodsii (McG.).—M. lineata (Linn. sp.).—M. Rosselii (Audouin sp.).—M. Lacroixii (Savigny sp.).
PLATE 27.—The Australian Rockling (Genypterus Australis, Cast.).
The Yarra Blackfish (Gadopsis gracilis, McCoy).
PLATE 28.—The Southern Mackerel (Scomber pneumatophorus, De la Roche).
PLATE 29.—The Yabber Crayfish (Astacoides bicarinatus, Gray sp.).
PLATE 30.—The Large Wattle Goat-Moth (Zeuzera Eucalypti, Boisd. Herr.-Schæf.).

DECADE IV.

PLATE 31.—The Australian Sea-Bear or Fur-Seal (Euotaria cinerea, Péron sp.).
PLATE 32.—The Two-hooded Furina-Snake, Furina bicucullata (McCoy).
PLATE 33.—The Banded Red Gurnet-Perch (Sebastes percoides, Solander sp.).
PLATE 34.—The Angel-fish (Rhina squatina, Lin. sp.).
PLATE 35.—Lepralia circinata (McG.).—L. Cecilii (Aud.).—L. diaphana (McG.).—L. marsupium (McG.).—L. subimmersa (McG.).—L. anceps (McG.).—L. Maplestonei (McG.).
PLATE 36.—Lepralia vittata (McG.).—Membranipora perforata. Lepralia Brogniartii (Aud.).—L. elegans (McG.).—L. pertusa (Esper. sp.).—L. Malusii (Aud. sp.).—L. lunata (McG.).
PLATE 37.—Lepralia ciliata (Linn. sp.).—L. trifolium (McG.).—L. cheilodon (McG.).—L. canaliculata (McG.).—L. larvalis (McG.).—L. diadema (McG.).—L. papillifera (McG.).—L. Ellerii (McG.).
PLATE 38.—Lepralia monoceros (Busk).—L. excavata (McG.).—L. vitrea (McG.).—L. megasoma (McG.).—L. Schizostoma (McG.).—L. Botryoides (McG.).—L. ferox (McG.).—L. pellucida (McG.).
PLATE 39.—Crisia Edwardsiana (D'Orb. sp.).—C. biciliata (McG.).—C. acropora (Busk).—C. setosa (McG.).—C. tenuis (McG.).
PLATE 40.—Saunders' Case-Moth (Metura elongata, Saunders sp.).
The Lictor Case-Moth (Entometa ignobilis, Walk.).

DECADE V.

PLATE 41.—The Lace Lizard (Hydrosaurus varius, Shaw sp.).
PLATE 42.—The Spotted Marsh-Frog (Limnodynastes Tasmaniensis, Günth.).—The Common Sand-Frog (Limnodynastes dorsalis, Gray).
PLATE 43.—The Carpet Shark (Crossorhinus barbatus, Lin. sp.).—The Seven-gilled Shark (Notidanus [Heptanchus] Indicus, Cuv.).
PLATE 44.—The Barracouta (Thersites atun, Cuv.).—The Tunny (Thynnus Thynnus, Lin. sp.).
PLATE 45.—Flustra denticulata (Busk).—Carbasea episcopalis (Busk).—C. dissimilis (Busk).—C. indivisa (Busk).—C. elegans (Busk).—C. pisciformis (Busk).
PLATE 46.—Spiralaria florea (Busk).—Diachoris Magellanica (Busk).—D. spinigera (P. McGil.).—Dimetopia spicata (Busk).—D. cornuta (Busk).—Didymia simplex (Busk).—Calwellia bicornis (Wyv. Thomson).
PLATE 47.—Dictyopora cellulosa (P. McGil.).
PLATE 48.—Eschara obliqua (P. McGil.).—E. dispar (P. McGil).—E. gracilis (Lamx.).—E. platalea (Busk).—E. quadrata (P. McGil.)—E. mucronata (P. McGil.).—Caleschara denticulata (P. McGil.).
PLATE 49.—Cellaria fistulosa (Linn.).—C. hirsuta (P. McGil.).—C. tenuirostris (Busk.).—C. gracilis (Busk).—Nellia oculata (Busk).—Tubucellaria hirsuta (Busk).
PLATE 50.—The Great Black, or Manna Cicada (Cicada mœrens, Germ.).—The Great Green Cicada (Cyclochila Australasiæ, Donov. sp.).

DECADE VI.

PLATE 51.—The Victorian Rhodona (Rhodona Officeri, McCoy).
PLATE 52.—The Black and White Ringed Snake (Vermicella annulata, Gray).
PLATE 53.—The Green and Golden Bell-Frog (Ranoidea aurea, Less. sp.).
PLATES 54–55.—The Australian Aulopus (Aulopus purpurisatus, Rich.).
PLATE 56.—The Hammer-headed Shark (Zygæna malleus, Shaw).—The Common Australian Saw-Fish (Pristiophorus nudipinnis, Günth.).
PLATE 57.—Biflustra perfragilis (McGil.).—B. delicatula (Busk).
PLATE 58.—Cellularia cuspidata (Busk).—Menipea crystallina (Gray sp.).—M. cyathus (Wyv. Thomson).—M. cervicornis (McGil.)—M. tricellata (Busk).—M. Buskii (Wyv. Thomson).
PLATE 59.—Bicellaria tuba (Busk).—B. grandis (Busk).—B. ciliata (Linn).—B. turbinata (McGil.).—Stirparia annulata (Map.).—Bugula neritina (Linn.).
PLATE 60.—Steganoporella magnilabris (Busk. sp.).—Petralia undata (McGil.).

Natural History of Victoria.

PRODROMUS

OF THE

ZOOLOGY OF VICTORIA;

OR,

FIGURES AND DESCRIPTIONS OF THE LIVING SPECIES OF ALL CLASSES

OF THE

VICTORIAN INDIGENOUS ANIMALS.

DECADE VIII.

BY

FREDERICK McCOY, F.R.S.,

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M DCCC LXXXIII.

PREFACE.

It having been considered desirable to ascertain accurately the natural productions of the Colony of Victoria, and to publish works descriptive of them, on the plan of those issued by the Governments of the different States of America, investigations were undertaken, by order of the Victorian Government, to determine the Geology, Botany, and Zoology of the Colony, to form collections illustrative of each for the public use, and to make the necessary preparations for such systematic publications on the subject as might be useful and interesting to the general public, and contribute to the advancement of science.

As the geological and botanical investigations have already approached completion, and their publication is far advanced, it has been decided now to commence the publication of the third branch completing the subject, namely, that of the Zoology or indigenous members of the different classes of the animal kingdom.

As the Fauna is not so well known as the Flora, it was a necessary preliminary to the publication to have a large number of drawings made, as opportunity arose, from the living or fresh examples of many species of reptiles, fish, and the lower animals, which lose their natural appearance shortly after death, and the true characters of many of which were consequently as yet unknown, as they had only been described from preserved specimens. A Prodromus, or

preliminary issue, in the form of Decades, or numbers of ten plates, each with its complete descriptive letterpress, will be published, of such illustrations as are ready, without systematic order or waiting for the completion of any one branch. The many good observers in the country will thus have the means of accurately identifying various natural objects, their observations on which, if recorded and sent to the National Museum, where the originals of all the figures and descriptions are preserved, will be duly acknowledged, and will materially help in the preparation of the final systematic volume to be published for each class when it approaches completion.

This eighth Decade gives figures in the first plate of the Victorian Sea-Bear, or Eared, or Fur Seal, of which an unusually grey female in the swimming position was figured in an earlier Decade. The additional representations here given show the adult male with its peculiar profile and slight mane, and the female, both of the more common brown colour. The present figures show the peculiar attitudes assumed on land, where the limbs are used like legs, raising the body from the ground as in ordinary quadrupeds, and totally unlike the more common ear-less Seals, in which the hind legs are fixed in the backward direction with the tail. The dark young is also shown. This plate is the first I have the pleasure of presenting by Dr. Wild, the famous artist of the *Challenger* Expedition.

The second plate figures one of our peculiar genera of Australian Lizards, *Cyclodus*, familiar to observers in the bush from its dull, sluggish habits and bright-blue tongue; from which characteristics its popular names are derived.

The third plate shows the natural colours for the first time of the best of our brackish-water fishes for the table, namely the thick-skinned "Ludric" of the Gippsland Lakes.

The fourth plate represents a specimen from Hobson's Bay of the most terrible of all Sharks, "The White Shark," the dread of

sailors in warm and temperate seas, but of which no good figure from life has been given before.

The fifth plate shows our common Picked Dogfish to be identical with the European *Acanthias vulgaris*.

The sixth and seventh plates give figures of the *Sepioteuthis Australis*, one of our large species of the ten-armed group of Cuttlefishes, having a row of horny spines round the edge of each of the suckers; and having a transparent internal horny "pen," popularly mistaken for an approach to the backbone of the vertebrate animals by rash upholders of the "progressive development" theory.

The eighth plate gives illustrations of the Victorian species of *Bugula*, contributed by Dr. MacGillivray to the National Museum and this work.

The ninth plate represents the character of one of the curious twig-like *Phasmæ* of the genus *Acrophylla*, showing the striking sexual differences.

The tenth plate figures the female of the greatest of our gigantic *Phasmæ*, the large pink-winged *Phasma* of the genus *Podacanthus*, showing the colours of life for the first time.

The succeeding Decades will illustrate as many different genera as possible, and will deal first usually with species of some special interest, and of which good figures do not exist, or are not easily accessible.

FREDERICK MCCOY.

16th August, 1882.

Dr J. J. Wild ad nat. lith.

Prof. McCoy direx.

Steam Litho. Govt. Printing Office.

PLATE 71.

EUOTARIA CINEREA (PÉRON SP.).

THE AUSTRALIAN SEA-BEAR OR FUR-SEAL.

[Genus EUOTARIA (GRAY). (Sub-kingd. Vertebrata. Class Mammalia. Order Feræ. Section Pinnipedia. Fam. Phocidæ. Sub-fam. Otarinæ.)

Gen. Char.—Incisors, $\frac{3—3}{2—2}$; upper outer ones very large, like canines; four middle ones small, and with cutting edges doubled by a transverse groove; lower ones small, sub-equal, simple. Canines, $\frac{1—1}{1—1}$; large, conic. Molars, $\frac{6—6}{5—5}$; triangular, pointed, compressed, with a small cusp at base, behind or before, or both; sixth or hind molar entirely behind the hind margin of front of zygomatic arch, with anterior branch of fang arched, diverging to front; the fangs of fourth and fifth imperfectly divided by a sulcus. Skull depressed; of males, broad, with the occipital portion elevated and becoming crested with age; that of females narrower, not so elevated behind, and with little or no occipital crest; palate extending to middle of zygoma. Head blunt. Anterior limbs falcate, with four or five rudimentary nails; hind limbs bent forwards when resting or walking, with long nails on three middle toes, and very small ones on the two outer toes. Body tapering, tail short. Males larger and with proportionately larger limbs than the females. Hair rather coarse, with scanty or no under-fur at base.]

Thinking it desirable to visit the actual locality in Western Port Bay, where the French voyagers with Quoy and Gaimard originally found the type specimen of this species, still in the Paris Museum, I last year went out in a small steamer from Phillip Island to the smaller island on which these Seals abound in the breeding season. The coast is so rocky, and the surf so dangerous that it is only on rare occasional days that a landing can be safely made, and on this occasion it was quite impossible to do so. On looking with a good binocular, one could soon make out that the greater number of what looked like brown, bare, rounded rocks over the surface of the island were really Seals. On the steam whistle being blown they all started up, and, with the precise action of a flock of crowded sheep driven by a dog, they awkwardly galloped in a confused cluster, jumping up on those in front in their hurry to get down to the sea, into which most of them plunged; a few old large males alone standing their ground, well raised up on their bent fin-like legs, as in our plate, with their broad breast to the foe, and head raised, threateningly showing their teeth, and erecting the hair of the neck angrily, like a short mane. After a little while, scores of the females and younger males came swimming out to our little vessel

to look at us, raising their kind, intelligent, good-humored, dog-like heads, with beautiful large, brown, soft eyes, looking like large Retriever Dogs with the pleased and friendly expression they wear when approaching their masters.

Making an arrangement with an old sealer living on Phillip Island, and greatly aided by Mounted Constable George Ardill, stationed on duty there, I ultimately got for the Melbourne Museum the fine old male, the adult female, and the young one, figured on our present plate in the attitudes of life when on land, as noted at the time, and now represented by Dr. Wild (the accomplished artist, formerly of the *Challenger* Expedition) from the preserved specimens set up with every attention to accuracy of form and position of the parts. These additional lithographs of this species, not figured by Mr. Gould, and which will soon become extinct on our shores, were desirable because our former figure, in Plate 31 (Decade IV.), was of an unusually grey specimen, and only gave the position of the limbs and body when swimming, which differs little from other Seals; while the attitudes assumed on land, shown in the present plate, are peculiar to the Seals having external ears.

The task of procuring the required specimens was by no means an easy one, for not only is it difficult to land, even in the calmest weather, but if a boat approached the island by day the Seals would take to the water, and not return so long as the men were to be seen. It was therefore determined to land on the first calm evening, and bring blankets and food for the night, to be passed in some of the caves found there, so that, as the Seals came back at night to rest, the sealers might quietly emerge before daybreak, and, selecting an adult old male and female, make sure of them with heavy rifles used for the purpose, and take chance of catching a young one in the confusion. This was at last successful, and I was enabled to get accurate drawings of the diverse profiles of the male and female, and of all the soft parts while yet in the flesh.

During the breeding season the roaring of the old males may be heard half a mile off, high above the thunders of the surf, and they show great courage and ferocity in defending the females and

young when attacked by man. The young are very easily tamed, and one was going about the kitchen of the hotel at the time of my visit like a rather lame dog, following the housekeeper everywhere with affectionate pertinacity, and playing with a young kangaroo and some other tame animals about the house with all the fun of a kitten or young puppy. It would come when called like a dog, and obviously liked to have its head stroked with the hand.

Having told my friends, Trooper Ardill and the sealer, Ross, that I should like to have their observations on the creature in writing for publication, the former furnished me with the following interesting account, which I give in his own words, conveying Ross's observations and his own :—

Cowes Police Station, 12th March 1880.

In reply to your enquiries relative to the Seals which frequent the Seal Rocks off Phillip Island:—The Seals come to the rocks about 1st October. The time of bringing forth the pups is between 10th November and 10th December. They do not commence to breed until they are three years old. The male (or bull) during the pupping season will ascend the rocks and stop for one or two months without food, and is extremely attentive to the female (or cow) and pups. When the females fight and quarrel he restores order. The bull is very fat in the beginning of the season, and yields from five to ten gallons of oil, and in three weeks after will hardly yield one gallon, the yield of course depending on the age and size of the bull. The cows are seldom killed, as they have very little fat. It is against the rule of sealers to kill a cow or the pups.

They live on fish of various kinds. I have found the backbones of fish 2 feet in length. They eat leather-jackets, parrot fish, squid, &c. I found one backbone 2 feet 4 inches long; it may have been a barracuta or pike; I don't think it was a shark. I have found a few joints of a shark's backbone.

The bull is very furious at pupping season, and when disturbed will go into the water and return in a few minutes. Out of season they go to sea in the morning and return at night. When fighting they strike each other like the boar; their teeth are about $1\frac{1}{2}$ inches long, and cut terribly. I have seen cuts from 1 to 10 inches in length.

The usual color is a yellowish-brown, although some have been seen that were spotted, and some a beautiful grey.*

They generally select flat, inaccessible rocks, or, where they are not disturbed, they select the grassy patches.

The cow generally brings forth one pup, sometimes two. They keep good watch, and care affectionately for their offspring. They circle round them in rough stormy weather, and keep them from any wash or sea that may come over the rocks. I have seen three pups washed off the rocks, and the cows have immediately followed and brought them on the rocks again in an astonishingly rapid manner. I have also seen them catch a pup in their mouth, and throw them 10 feet high, and never hurt them.

* This is the variety figured in Decade IV., Plate 31.

The bull's voice or noise is guttural, and, when angry, sounds something like "oough oough;" the noise is much heavier than any animal I know. When trying to pacify the cows it sounds like "yah yah," said quick and short. The noise of the cow is very much like a cow of the bovine species. The pup bleats like a lamb.

Their sight is not so good, so it is generally said. I think, myself, their sight good enough, but they not smelling man don't think he will harm them; when they get the least scent they are off like a shot.

During the pupping season they keep up an incessant noise during the night, and generally keep quiet during the day. They look clumsy and awkward on the rocks, but they are very lively when on the move.

I consider them as quick in their movements as any fish that swims. They strike at one another with the rapidity of lightning. I have seen one bull prevent another from landing for several hours. They move along by drawing the hinder part of the body forward and under, and then giving a jump and push forward.

If they are disturbed before they pup, they will leave the rock and go to another.

The cow has six teats, I think, which they draw into the udder or body when not suckling their young. The milk is very white and strengthening. Should a cow die or be killed, her pup is suckled by the other cows. This I am told is the case, but I can't vouch for it. All I write is my experience on the Seal Rocks, off "The Nobbies," at Phillip Island, Victoria.

I can't say whether they inhabit these rocks all the year or not, but don't think so. I have heard Ross say they do not.

As regards their habits, fur, ears, &c., &c., the only difference being in the colour; some are darker than others.

They are found along the coast, as far as I know, from Phillip Island to Wilson's Promontory. Nearly all the islands in Bass's Straits are inhabited by seals.

I know of no other fur or eared seal; in fact there is no other seal about here.

(Signed) GEORGE ARDILL,
Mounted Constable.

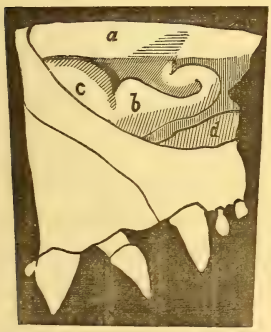
The large bull above referred to, although 7 ft. 9 ins. long, had the epiphyses of the limb bones quite loose, as if young; the skull bones were, however, much more powerfully crested than in those previously described in Decade IV.

The following are the detailed measurements :—

	Ft.	ins.
Length from tip of snout to extremity of tail	7	9
„ from tip of snout to edge of lip	0	3½
„ from tip of snout to occiput	1	2
„ from tip of snout to edge of front of pectoral ...	3	9
„ between eyes across forehead	0	5¼
„ from tip of snout to eye	0	5½
„ from tip of snout to ear	0	11
„ of pectoral	2	1½
„ of ear	0	2¼
„ of tail	0	3
„ of hind fin	1	7¼
Greatest width of hind fin...	1	2½
Length of Whiskers	0	7¼
Girth in front of shoulder	6	10

The bare portion of snout below 2 inches long, and 1 inch 10 lines in greatest width; the width of portion between the nostrils being only half an inch, and 1 inch 3 lines long. The middle nail of hind foot is 1 inch long, but from its tip to edge of the cartilaginous fin is $3\frac{1}{2}$ inches. Mr. Clark states (l. c., p. 662) that the corresponding nail in the New Zealand *O. Forsteri* is only its own length from the edge, while suggesting that this distance may be a specific character.

The nasal cartilage here figured from a young skull is more complex than that of *O. Forsteri* figured by Mr. Clark (Zool. Jour. 1875, p. 665). The upper fold (*a*) is, like it, wider in the centre, but has a shallow dividing furrow extending from the middle of the lower side obliquely upwards and forwards. The lower fold (*b*) and the hinder one, or bulla, as Mr. Clark calls it (*c*), are both as flexible as the upper fold, and further differ in the fold (*b*) having a circinate or crozier-shaped backward defined prolongation on its upper anterior end. The ligament (*d*) is alike in both. In this young skull, 6 ins. long, the described cartilages are 1 inch $2\frac{1}{2}$ lines long.



The bare parts of the snout and flippers, in the living state, are black; and the nostrils angulated. The general colour of the surface is yellowish grizzly brown; ears lighter, with black tip; middle of breast and belly darker brown; under-fur light chestnut-brown, darkest on belly.

The snout of the adult male is not nearly so slender, tapering, and obliquely truncated as in the New Zealand *O. Forsteri*, as figured by Mr. Clark and Dr. Hector (Zool. Jour., Dec. 7, 1875, pp. 660 and 663); and in the females and young the snout is more bluntly rounded, and the nostrils more nearly terminal than in the adult. The outline figures I give now are reduced from the life-sized drawings made from specimens before being skinned, and can be compared with the corresponding views given by Mr. Clark of the *O. Forsteri*. Instead of the great concavity figured vertically

over the eye in *O. Forsteri*, our species shows a great convexity there, the concavity in the male being at half-way between the eye and the tip of the snout, making the head much shorter and rounder in profile than in the N. Zealand species. The female and young have the head still shorter and rounder, and our figure shows that the nostrils are more nearly terminal in the young, on a blunt muzzle.

The hair is moderately coarse, and about $1\frac{1}{2}$ inches long on back of neck of male, and rather more than $\frac{3}{4}$ of an inch on the back, and about $\frac{1}{2}$ inch long on belly. The individual hairs on neck and back are mostly light-yellowish grey throughout, mixed with rather fewer of a blackish-brown colour, having tip and small part of base of a pale-yellowish colour; the hairs below are uniform dark brown, except a small portion of base, which is nearly colourless.

EXPLANATION OF FIGURES.

PLATE 71.—The left-hand figure is an adult female, with the lower rounded profile of the head found in that sex. The large upper middle figure is an adult male, showing the elevation of the forehead produced by the more prominent occipital crest of the skull, giving the characteristic profile of the old male; also showing the longer hair of the neck and breast, constituting an imperfect mane, found only in this sex. The right-hand figure is a front view of an old male to show the narrow, elevated mesial ridge of the head. The middle lower figure represents the dark young in an attitude taken, like the others, from life.

FREDERICK MCCOY.

ZOOLOGY OF VICTORIA

(Reptilia)

D^r J. J Wild ad nat lith

Prof. M^c Coy direx^t

Steam Litho. Govt. Printing Office

PLATE 72.

CYCLODUS GIGAS (BODD. SP.).

THE NORTHERN BLUE-TONGUED LIZARD.

[Genus CYCLODUS (WAGLER). (Sub-kingd. Vertebrata. Class Reptilia. Order Sauria. Sub-order Leptoglossæ. Tribe Geissosauria. Family Scincidæ.)

Gen. Char.—Form moderately thick, elongate, fusiform. Head large, thick, subtrigonal, obtusely pointed in front. Neck short, thick; head-shields thick, rather rugose; nasal plates near the tip of snout touching (or nearly) each other above, ovato-trigonal; nostril in centre of nasal plate, with a curved furrow bordering its posterior edge; inter-nasal plate rhombic; no supra-nasals; fronto-nasals two, moderate, touching; frontal large, broad, obtuse-angled in front, narrow behind; two moderately large fronto-parietal plates; parietals large; inter-parietal resembling the frontal, and nearly as long but much narrower, acute-angled in front; six superciliary plates over each eye, the second largest; about five rows of temporal plates between the eye and the ear; polygonal occipital shields in one or more transverse rows; orbit surrounded by a row of small plates; two frenal plates between the nasal plate and the orbit; lower eye-lid scaly. Ear-opening large, partly hidden by a projecting row of three or four thin, rounded scales on front margin. Scales of back and sides bony, large, convex, subhexagonal, rugose, with obscure diverging grooves; scales of belly thinner and smoother. Legs four, nearly equal, small, short, strong; feet small, each with five short, cylindrical, sub-equal toes; claws short, thick. Tail short, rather less than one-third of the total length, sub-cylindrical, very slightly compressed laterally, tapering, with rather thicker scales than the back of the body, and a central row of large, broad scales below. Tongue short, flat, scaly, slightly notched at the point. Teeth on edge of jaws bluntly rounded; palate without teeth, with a triangular notch behind.]

DESCRIPTION.—Form elongate, rounded, moderately depressed; head obtusely pointed in front, widening behind to the ear, and moderately narrowed to the short thick neck. The four temporal plates immediately behind the row of ocular plates surrounding the eye, and forming the side of the cheek from the parietal plates above to the hindmost labial plates below, about twice the length of those temporal plates next following them posteriorly. Rostral plate much wider than long. Nasal plates usually joining for a short space (but sometimes not joining) above. Inter-nasal plate about one-fifth longer than wide. Width of anterior part of frontal about three-fifths of the length. Inter-parietal plate very narrow behind, about twice as long as wide. Lower projecting scales on anterior edge of ear-drum largest. General colour yellowish very pale brown, greyer and lighter below, crossed by from 14 to 20 transverse bands of rich dark-brown, varying from 3 to 6 scales wide on the back, with narrower intervening light bands crossing from the neck to the tip of the tail, the two anterior transverse bands on the neck and shoulder much narrower than the others. One longitudinal very dark patch over the shoulder, extending from near the ear, is nearly constant and darker than any other mark. A less dark patch over the middle temporal plates from behind the eye to nearly over the ear sometimes present and sometimes absent. Top of the head uniform very light brown, becoming paler on the sides of the head and neck, and more distinctly yellow on the throat. The longitudinal rows of scales on the anterior part of the back are marked by narrow, indistinct, longitudinal dark-brown streaks at the lateral margins of each scale. On the sides there are usually three or four indistinct longitudinal lines on

each side of triangular light-colour spots, continuing the lines of the anterior brown streaks (but not constant). Under-side of body and tail irregularly flecked or reticulated with triangular brown spots, imperfectly continuing the transverse bands of the back and sides, but often absent. Legs with the margin of the scales dark-brown on the upper and hinder surface. Tongue bright Prussian blue, inside of mouth pink.

	Ft.	ins.	lines.
Total length of rather large specimen	1	9	9
Length of head from snout to anterior edge of ear ...	0	2	4
Length of inter-nasal plate	0	0	5
Width „ „	0	0	6
Length of frontal plate	0	0	7
Greatest width of do.	0	0	4½
Length of inter-parietal	0	0	7
Greatest width of do.	0	0	4
Length of middle temporal plate	0	0	7
Height of rostral plate	0	0	3
Diameter of ear	0	0	2½
From tip of snout to anterior edge of shoulder	0	4	0
Length of anterior limb to tip of longest claw	0	2	6
„ of longest toe and claw	0	0	5
„ from anterior edge of shoulder to anterior edge of thigh	0	7	6
„ of hind limb to extremity of longest claw	0	2	6
„ of tail	0	8	0
Girth round middle of body	0	8	0

Four transverse and five longitudinal rows of scales in space of one inch on middle of back.

REFERENCE.—*Scincus gigas* (Boddaert), Nov. Act. Curios. Nat. Acad. v. 7, p. 5 = *Lacerta sincoides* (White) J. Voy. N.S.W., t. 30 = *Cyclodus flavigularis* (Wooster) Leon. Descript. Amphib. t. 6 = *Cyclodus Boddaerti* (Dum. and Bib.) Erp. Gen. v. 5, p. 752.

There are two Lizards of the genus *Cyclodus*, very nearly alike, found in Victoria. The one figured, the *C. gigas*, is very rare near Melbourne, becoming more common farther north into New South Wales. It is easily distinguished from the more common species, the *C. nigro-luteus*, by the four anterior temporal plates of the first row behind the eye being double the length of the next following, more posterior, row. The disposition of the colouring varies to the extent referred to above, but always shows the transverse dark and light bands, instead of the lateral rows of large light blotches of the second species, in which the anterior temporal plates are relatively only half the length, not equalling those of the next following, more posterior, row. Both have the startlingly bright-blue tongue, which the creature displays in its pink open mouth when touched. When taken in the hand it does not bite, nor make any other hostile demonstration. These Lizards are very sluggish, so that

the popular name "Sleepy Lizard" as well as "Blue-tongue" comes to be applied to both.

The specimen figured is from near Melbourne. There has been no good figure of this creature hitherto published, with sufficient detail to be useful for accurate identification of the species.

EXPLANATION OF FIGURES.

PLATE 72.—Fig. 1, specimen one-half natural size. Fig. 1*a*, plates of side of head. Fig. 1*b*, plates of top of head. Fig. 1*c*, scales of back, natural size. Fig. 1*d*, teeth, magnified two diameters.

FREDERICK MCCOY.

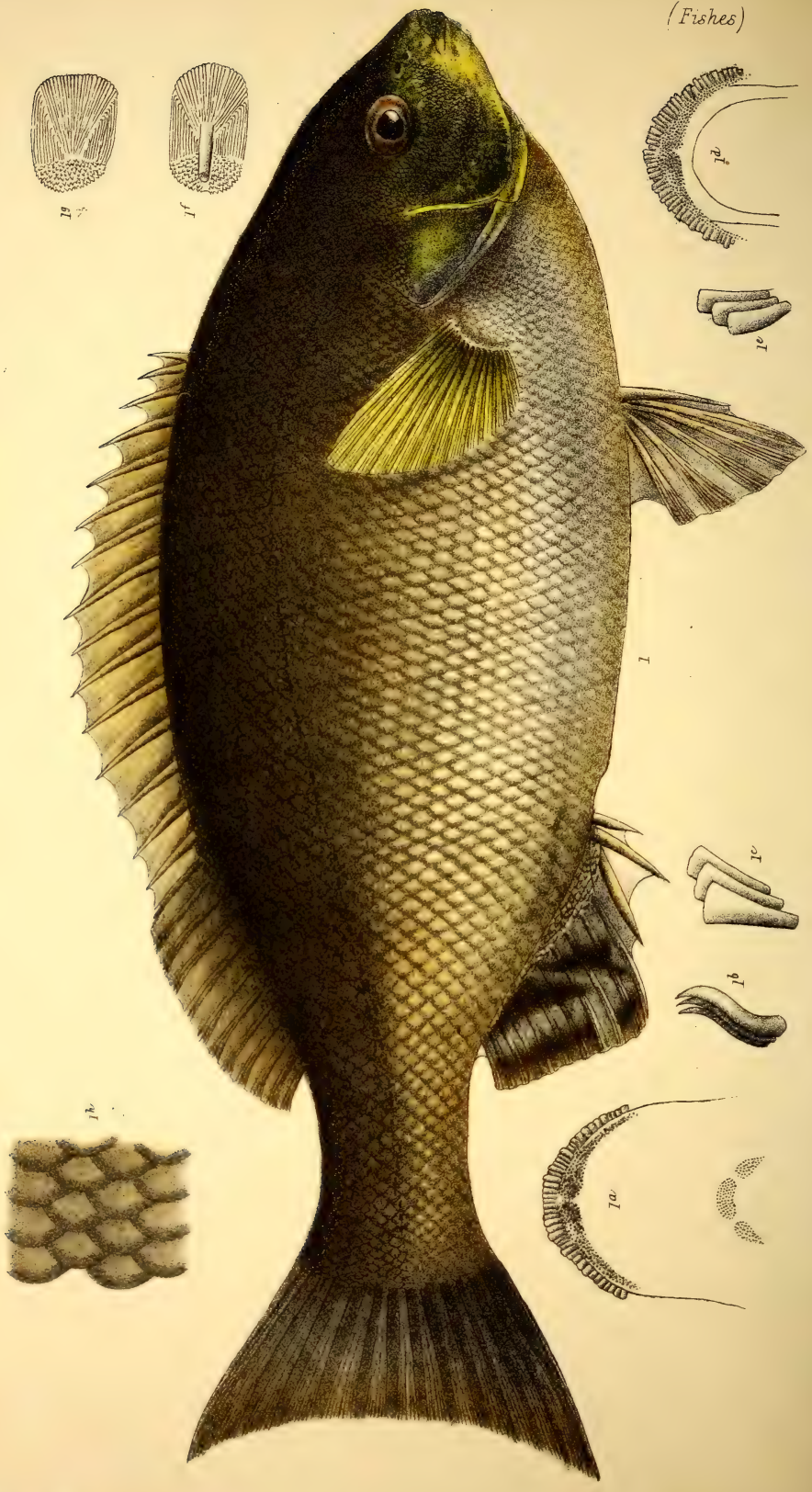

1g
1f
1d
1e
1
1c
1b
1h
1a

PLATE 73.

GIRELLA SIMPLEX (RICH. SP.).

THE LUDRICK.

[Genus GIRELLA (GRAY) = MELANICHTHYS (TEM. and SCH.). Sub-kingd. Vertebrata. Class Pisces. Sub-class Teleostea. Order Acanthopterygii. Fam. Sparidæ. Sub-fam. Cantharinæ.)

Gen. Char.—One to three rows of large, flat, sharp-edged teeth, with tricuspid or straight, horizontal edges, on outer margins of each jaw, within which is a band of numerous minute teeth; no molars; in some species a patch of small teeth on the vomer and palatine bones. Cheeks scaly. Operculum without scales, except on the upper angle. Dorsal spines fourteen or fifteen; when depressed resting in a groove. Scales moderately large. Branchiostegals six. Pyloric cæca numerous. Swimming bladder bilobed behind.]

DESCRIPTION.—*Form:* Ovate, moderately thick. *Fin-rays:* Dorsal 15 spined, 12 soft, the last one double, 7th spine longest, slightly exceeded by longest (3rd) soft ray; caudal 20; anal 3 spined, 11 soft, last one double; pectoral 17; ventrals 1 spined, 5 soft. *Scales* minutely serrated, 69 along lateral line, and about 5 beyond on the caudal fin; 12 above lateral line, and 17 large and 9 or 10 small below. *Colour:* Nearly uniform blackish-grey, with a purple tinge, darkest on back and soft dorsal, and on caudal and anal fins; sides of mouth and head below the eye from snout bright king's yellow, gradually fading on operculum; pectoral fin pale-brownish yellow; chin, throat, belly, and ventral fins whitish; iris silvery. *Teeth:* Three outer rows in each jaw large, incurved, with nearly straight, broad, cutting edges; within them a band of very minute similar ones; a trigonal patch of minute teeth on the vomer, and an ovate similar patch on each palatine bone.

MEASUREMENTS OF MODERATELY LARGE SPECIMEN.

	Ft.	ins.	lines.
Length from tip of snout to end of body	1	4	6
„ of middle of caudal	0	2	6
„ from tip of snout to corner of mouth	0	1	1
„ „ „ anterior edge of orbit ...	0	1	5
„ „ „ end of operculum	0	4	0
„ „ „ base of pectoral	0	4	0
„ „ „ base of ventrals	0	5	9
„ „ „ first spine of dorsal	0	5	6
„ „ „ last spine of dorsal	0	11	0
„ „ „ last soft dorsal ray	1	2	0
„ „ „ first spine of anal	0	10	9
Greatest depth of body	0	6	0
„ thickness of body	0	1	9
Diameter of orbit	0	0	8
Length of pectoral	0	2	7
„ ventral spine	0	1	5
„ 1st soft ray of ventral	0	2	7
„ 1st dorsal spine	0	0	6½
„ 7th „	0	1	5
„ 1st anal spine	0	0	7
„ 2nd „	0	1	0
„ 3rd „	0	1	2
„ 2nd soft ray...	0	1	9
Width of caudal	0	5	3

Number of scales in one inch at middle of body, three.

REFERENCE.= *Crenidens simplex* (Richard.), Voy. Er. and Ter., Fishes, p. 120.

This is one of the best fishes for the table found in Victoria, but is not well known to the public or the dealers, although abundant in the Gippsland Lakes. It is also not very uncommon in the sea outside as far as Hobson's Bay, where it is occasionally found at Mordialloc and Brighton, although it is there so unknown to the fishermen as to be brought to me as a rarity when they catch it. In the Gippsland district it goes by the native name of "Ludrick," and is greatly preferred even to the excellent Gippsland Perch (*Lates colonorum*, see our Plate 14). It has a remarkably thick skin, by which the unscientific carver distinguishes it from its allies at table. The three outer rows of long, incurved teeth, having each a broad, nearly straight cutting edge, like a chisel, instead of the trilobed edge of the other species of *Girella*, is the perfectly constant and easily observed character referred to in the specific name. The patches of small, crowded teeth on the vomer and on the palatine bones seem another dental peculiarity of the species. The disc of each scale is smooth, the remainder towards the margin with rough, radiating, minute ridges, terminating in a very fine serration of the edge.

The species is curiously like the *G. tricuspidata*, or "Black Perch" of the fishermen, except in the simplicity of the edges of the teeth, almost suggesting the idea of this being a sexual instead of a specific character.

It is rarely quite so large as the one measured above ; but one specimen in the Museum is 1 ft. 11 inches in total length.

This fish has not been figured before.

Explanation of Figures.

Plate 73.—Fig. 1, side view, reduced. Fig. 1*a*, inner view of upper portion of mouth, natural size, showing the large outer rows of teeth, and the more numerous rows of similar but much smaller teeth, as well as the patches of small teeth on the vomer and palatine bones. Fig. 1*c*, front view of large teeth, magnified. Fig. 1*b*, same, viewed sideways. Fig. 1*d*, teeth of lower jaw and the tongue, natural size. Fig. 1*e*, outer teeth, magnified. Fig. 1*f*, scale from lateral line, magnified. Fig. 1*g*, scale from above lateral line, showing the minute serration, magnified. Fig. 1*h*, patch of scales from middle of body, natural size.

Frederick McCoy.

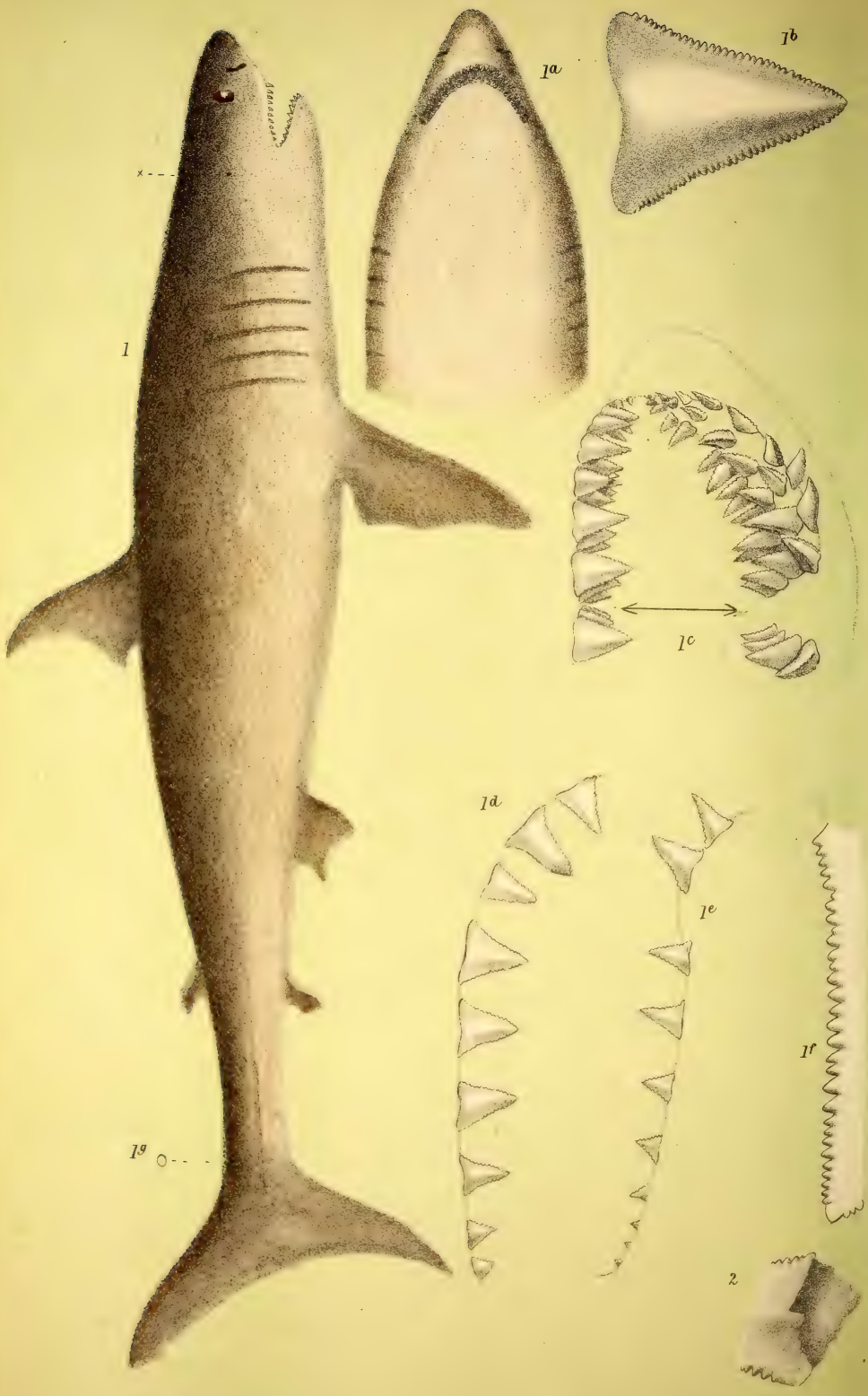

1
1a
1b
1c
1d
1e
1f
1g
2

PLATE 74.

CARCHARODON RONDELETII (MÜL. AND HEN.).

THE WHITE SHARK.

[Genus CARCHARODON (A. SMITH). (Sub-kingd. Vertebrata. Class Pisces. Order Plagiostomata. Sub-order Selachoidea. Family Lamnidæ.)

Gen. Char.—First dorsal fin over the space between the pectoral and ventral fins; second dorsal and anal fins nearly equal and very small. A pit at upper and under side of base of caudal fin. Caudal fin crescentic, from having a large, pointed lower lobe two-thirds the length of the upper one. Sides of the tail keeled. No nictitating eyelid. Spiracles very small or absent. Teeth large, flat, triangular, equilateral, serrated on the edges, base hollow, without ridge, alike in both jaws, but those of lower jaw narrower; no median tooth. Scales minute, with three keels. Gill-openings wide. Cosmopolitan.]

DESCRIPTION.—*Form:* Elongate, fusiform; snout sub-triangular, rounded at the point; nostrils large, about midway between tip of snout and mouth, rather nearer to the eye. Spiracles a minute pore on each side, level with the general surface, a little below the eye and behind the mouth. Gill-openings very large. Anterior edge of 1st dorsal behind the posterior edge of pectoral; second dorsal very small, its posterior edge just over the anterior edge of equally small anal fin. A strong longitudinal keel on each side of tail, with a deep oval pit on midline over their posterior third. Caudal large, crescentic, the lower lobe pointed like the upper lobe and almost equally large. *Teeth:* Very large, broad, triangular, with a thin-edged hollow base, coarsely serrated on the sides; third upper tooth on each side much smaller than the second or fourth, on each side above and below. *Colour:* Ashy brownish-grey above, paler below.

MEASUREMENTS.	Ft.	ins.	lines.
Total length to end of upper lobe of caudal	16	2	0
„ „ middle of caudal	15	0	0
Length from snout to origin of dorsal	5	6	0
„ of base of dorsal	1	4	0
Height of dorsal	1	11	0
Length from snout to anterior base of 2nd dorsal	10	5	6
„ of base of 2nd dorsal	0	2	6
Height of anterior part of 2nd dorsal	0	4	6
„ posterior lobe	0	2	3
Length of lateral tail ridge	1	8	0
Length from anterior origin of base of caudal fin to tip of upper lobe	2	10	0
Depth of lower lobe of caudal	1	6	0
Length from snout to anterior base of pectoral	4	3	0
„ of base of pectoral	1	2	0
„ of anterior margin of pectoral	3	0	0
„ from posterior base of 2nd dorsal to origin of caudal	1	11	0
„ from posterior base of anal to origin of caudal ...	1	6	0
„ from hind edge of ventral to anterior edge of anal ...	1	10	0
„ „ pectoral to anterior edge of ventral	3	9	0
„ of base of ventral	0	9	0
„ of anterior margin of ventral	0	8	0

Measurements—*continued.*	Ft.	ins.	lines.
Length from snout to anterior edge of base of anal fin ...	8	9	0
„ of base of anal	0	2	6
„ of anterior margin of anal	0	4	6
„ from tip of snout to upper edge of nostril ...	0	7	0
„ „ „ anterior edge of orbit ...	0	10	0
„ „ „ spiracle	1	8	6
„ of orbit	0	1	10
„ of nostril	0	2	5
Diameter of spiracle	0	0	2
Width of mouth	1	4	0
Length of 1st tooth	0	1	5
Width at base	0	1	3
Length of 2nd tooth	0	1	7
Width at base	0	1	5
Length of 3rd tooth	0	1	0
Width at base	0	0	10
Length of 4th tooth	0	1	6
Width at base	0	1	3
Length from tip of snout to middle of front edge of mouth	0	10	0
„ of 1st gill-opening	1	5	6
„ of 2nd gill-opening	1	7	6
Girth	7	6	0
Length of 1st lower tooth	0	1	3
Width at base	0	0	10
Serratures, about 10 in 6 lines, closer near point, slightly irregular.			

Reference.—(Müller and Henle) Plagiost. p. 70 = *Carcharodon lamia* (Bonap.) F. I. = *Carcharias verus* (Ag.) Poiss. Foss. vol. 3, p. 91, t. F. fig. 3; ? = *Carcharodon Capensis* (Smith) Zool. S. Africa, Pisces t. 4.*

This gigantic Shark is by far the largest and most formidable of those approaching our shores, one specimen in the Museum being thirteen feet three inches long, and another between fifteen and sixteen feet long, and some having been killed upwards of thirty feet long. Our two specimens were caught, one in July, 1873, and one in April, 1877, in Hobson's Bay, near Brighton. The larger had been observed for several days swimming round the ladies' baths, looking in through the picket fence in such a disagreeable manner that the station master had a strong hook and iron chain made so as to keep the rope out of reach of his teeth, and this, being baited with a large piece of pork, made to look as much like a piece of a lady as possible, was swallowed greedily ; and then, with the aid of a crowd of helpers, the monster was got on shore. On opening the stomach, amongst a load of partially digested objects, a large Newfoundland dog was found, with his collar on, identifying him as one lost the day before, no doubt swallowed

* Dr. Smith's figure of his *C. Capensis* must be bad, as it shows no anal fin, and I am doubtful whether the other differences between his figure and mine may be errors also, or whether, consequently, his species be a peculiar new one, or referable to this old one.

when enjoying a swim in the comparatively shallow water in which the Shark was repeatedly seen and at last caught.

Dr. Günther has suggested the name "Great Blue Shark" for the present species, but as its colour is not strikingly blue, but rather whitish, the old English name of "White Shark" had perhaps better be adhered to, although no doubt, as Duméril complains, more than one species seem to have been confounded by English writers, and sailors in many waters, under this name. The present fish, however, has the best claim to the name, and is probably also the *Carcharias* of the old Greek writers. There can be no doubt that our fish, here figured, is the same as the terrible "White Shark" sometimes found on the English coasts, and more common in the West Indies ; probably the most dreaded by sailors of all Sharks from its great size, strength, and ferocity. The fearful armature of the mouth with rows of great triangular serrated teeth renders any wound fatal ; and the size, even in our waters, is often so great that a man could be swallowed whole with ease, as Capt. King mentions in his Survey of Australia ; Blumenbach, the famous anatomist, who was a perfectly trustworthy authority, mentions a whole horse being found in one. When fishermen are drawing their nets full of fish, this Shark will swim along, giving every now and then a half-turn and biting out a large mouthful of fishes and net, and swallowing them together. It was from representations by fishermen and their friends of the damage done to them and the destruction of fish, as well as danger to bathers when these fish and the great Bull Shark or Shovel-nosed Shark (*Odontaspis taurus*) appeared, that the Government was induced to place large sums on the Estimates for their destruction ; paying by measurement for hundreds of the harmless blunt-toothed Smooth Hound, Picked Dog-fish, and other small Sharks, as the young of these monsters.

This is the first recognisable figure of this famous Shark. Couch's figure has the lower lobe of the caudal fin too small, and the anal and second dorsal much too large and too far back. Smith's figure gives the proper shape of tail, but no anal fin. Yarrell's figures are not worthy of note ; and even the best of

them all, that by the Prince of Canino (Fauna Italica), has the pectoral and dorsal fins larger and more deeply notched, and the lower lobe of the tail smaller than in our sketch carefully measured from life.

EXPLANATION OF FIGURES.

PLATE 74.—Fig. 1, side view (the + and dotted line mark the small spiracle). Fig. 1*a*, underside of head. Fig. 1*b*, one of the teeth, natural size. Fig. 1*c*, reduced view of the rows of teeth on one side of upper and lower jaws, the arrow marking the front middle point of each, which is without tooth. Fig. 1*d*, reduced side view of outer row of teeth of upper jaw, to show the small relative size of the third one. Fig. 1*e*, corresponding view of lower row. Fig. 1*f*, serration of one side of tooth, magnified, to show its irregularity. Fig. 1*g*, pit at base of tail. Fig. 2, portion of tooth, broken, showing the hollow base.

FREDERICK MCCOY.

(Fishes)

PLATE 75.

ACANTHIAS VULGARIS (LINN. SP.).

THE PICKED DOG-FISH.

[Genus ACANTHIAS (MÜLLER and HENLE). (Sub-kingd. Vertebrata. Class Pisces. Order Plagiostomata. Sub-order Selachoidea. Family Spinacidæ.)

Gen. Char.—Elongate, slender. Two dorsal fins, each with a smooth, bony spine on front edge; pectorals moderate; ventral fins a little in front of posterior dorsal; no anal fin; caudal fin with a very wide, unnotched upper lobe, divided near the middle by the straight end of the body, which is not turned up; lower lobe small, pointed; mouth moderately arched, a long, straight, oblique groove on each side of mouth, but no labial fold; teeth rather small, alike in both jaws, points so much bent backwards that the anterior side forms a straight, horizontal, upper and lower cutting edge; no nictitating membrane; spiracles very large, a little behind the eye; gill-openings small, in front of base of pectoral; a distinct keel on each side of tail. Cosmopolitan.]

DESCRIPTION.—Slender, tapering; snout moderately tapering, narrow, rounded in front; mouth small, moderately arched, width three-fourths of the distance from tip of snout to its middle; nostrils nearer to tip of snout than to mouth; eye large; antero-posterior diameter about half the distance from the anterior edge to tip of snout; spiracles very large. Gill-openings small, the last one over the anterior edge of the base of the pectoral. Pectoral fin short, broad; anterior edge of first dorsal distinctly behind the vertical of the inner posterior angle of pectoral; posterior angle acutely pointed; second dorsal smaller, with posterior angle acutely prolonged. Spines of the two dorsals smooth, moderately arched, sharp at apex, moderately compressed, posterior one longer than the anterior, obtuse in front, hollowed behind, with two sharp, cutting, posterior lateral edges; ventrals covering the vent, terminating a little in advance of the anterior edge of second dorsal; caudal broad, upper lobe ovate, without notch, lower lobe short, pointed. *Colour:* Above ash-grey, with a few irregular white spots, most distinct in the young; below white; fins with a slight brownish tinge, and the dorsals and caudal with an indistinct blackish hue near tip; eye pale-green. Teeth about 4 in six lines near middle of jaw, about 1 line high, each with a tri-lobed base, and the conical sharp-pointed apex directed so completely backwards that the anterior edge forms a nearly horizontal, slightly convex, sharp, cutting edge.

MEASUREMENTS.	MALE.			FEMALE.		
	Ft.	ins.	lines.	Ft.	ins.	lines.
Total length to end of upper lobe of caudal ...	2	3	6	3	0	0
Length from snout to origin of 1st dorsal ...	0	9	3	1	0	3
„ of base of 1st dorsal	0	1	9	0	2	5
Height of 1st dorsal	0	1	9	0	2	5
Length from snout to anterior base of 2nd dorsal	1	6	6	1	11	0
„ of base of 2nd dorsal	0	1	3	0	1	9
Height of anterior part of 2nd dorsal	0	1	1	0	1	9
Length of posterior lobe of 2nd dorsal ...	0	1	3	0	1	7
„ from anterior origin of base of caudal fin to tip of upper lobe	0	4	7	0	6	3
Depth of lower lobe of caudal	0	1	10	0	3	0

Measurements—*continued.*	Male.			Female.		
	Ft.	ins.	lines.	Ft.	ins.	lines.
Length from snout to anterior base of pectoral...	0	5	10	0	7	6
„ of base of pectoral...	0	1	3	0	2	0
„ of anterior margin of pectoral ...	0	3	0	0	4	6
Greatest girth of pectoral	0	2	5	0	3	1
Length from posterior base of 2nd dorsal to origin of caudal	0	3	5	0	4	3
„ of hind edge of pectoral to anterior edge of ventral	0	7	4	0	9	6
„ of base of ventral	0	1	9	0	2	2
„ of anterior margin of ventral... ...	0	1	5	0	2	2
„ from tip of snout to upper edge of nostril	0	1	3	0	1	6
„ „ „ anterior edge of orbit	0	1	9	0	2	3
„ „ „ spiracle	0	2	9	0	3	8
„ of orbit	0	0	10	0	1	1
„ of nostril	0	0	3	0	0	4
Diameter of spiracle	0	0	4	0	0	4
Width of mouth	0	1	8	0	2	1
Length from tip of snout to middle of front edge of mouth	0	2	1	0	2	9
Length of 1st gill-opening	0	0	4	0	0	6
Girth	0	7	6	1	0	0
Length of exposed portion of posterior dorsal spine	0	1	0		—	
Width at base	0	0	2	0	0	2
Length of exposed portion of anterior dorsal spine		—		0	1	0
Size of scales about middle of body, nineteen in 3 lines.						

Reference.— = *Squalus acanthias* (Lin.), Syst. Nat. t. 1, p. 597; id. Bloch, t. lxxxv. = *Acanthias vulgaris*, Bonaparte, Cat. Pesci Europ. p. 15.

This little Dog-fish, which rarely exceeds two feet in length, is easily distinguished by the bony spines in front of the two dorsal fins, the absence of anal fin ; and the posterior termination of the tail in the same line as the body, instead of being abruptly turned up as in most sharks. As at home, it seems to bring forth its living young almost every day throughout all the warmer months of the year, each about 5 inches long, with a very large fig-shaped egg-bag hanging from it, $1\frac{1}{2}$ inches in diameter and upwards of 2 inches long. Their spines are much dreaded by the fishermen, from the painful wounds they can inflict with them ; always painful and difficult to heal, and sometimes producing lockjaw. When hooked or tangled by the head in a net they bend the tail over the head, and, suddenly lashing out straight, cut the cords and escape, or tear open a man's hand touching their head, with the sharp lateral edges of the dorsal spines ; the larger spine of the 2nd dorsal on the more flexible tail being the more effective.

I can find no difference between the English fish and ours on careful comparison of specimens, and I find the 1st dorsal as

much behind the pectoral in a Cornish specimen as in those from Hobson's Bay; but it is by no means so abundant here as in Cornwall, where twenty thousand were counted by Couch in one cast of the sea net.

Explanation of Figures.

Plate 75.—Fig. 1, dorsal view of male, reduced. Fig. 1*a*, side view of same specimen. Fig. 1*b*, under-side of head, to show the mouth and nostrils. Fig. 1*c*, nostril, with valve. Fig. 1*d*, spiracle. Fig. 1*e*, eye. Fig. 1*f*, teeth of upper jaw. Fig. 1*g*, teeth of lower jaw. Fig. 1*h*, posterior spine, natural size. Fig. 1*i*, transverse section of spine. Fig. 1*j*, section of body. Fig. 1*k*, section of tail.

Frederick McCoy.

A. Bartholomew del et lith.

Prof. Mc Coy dirext

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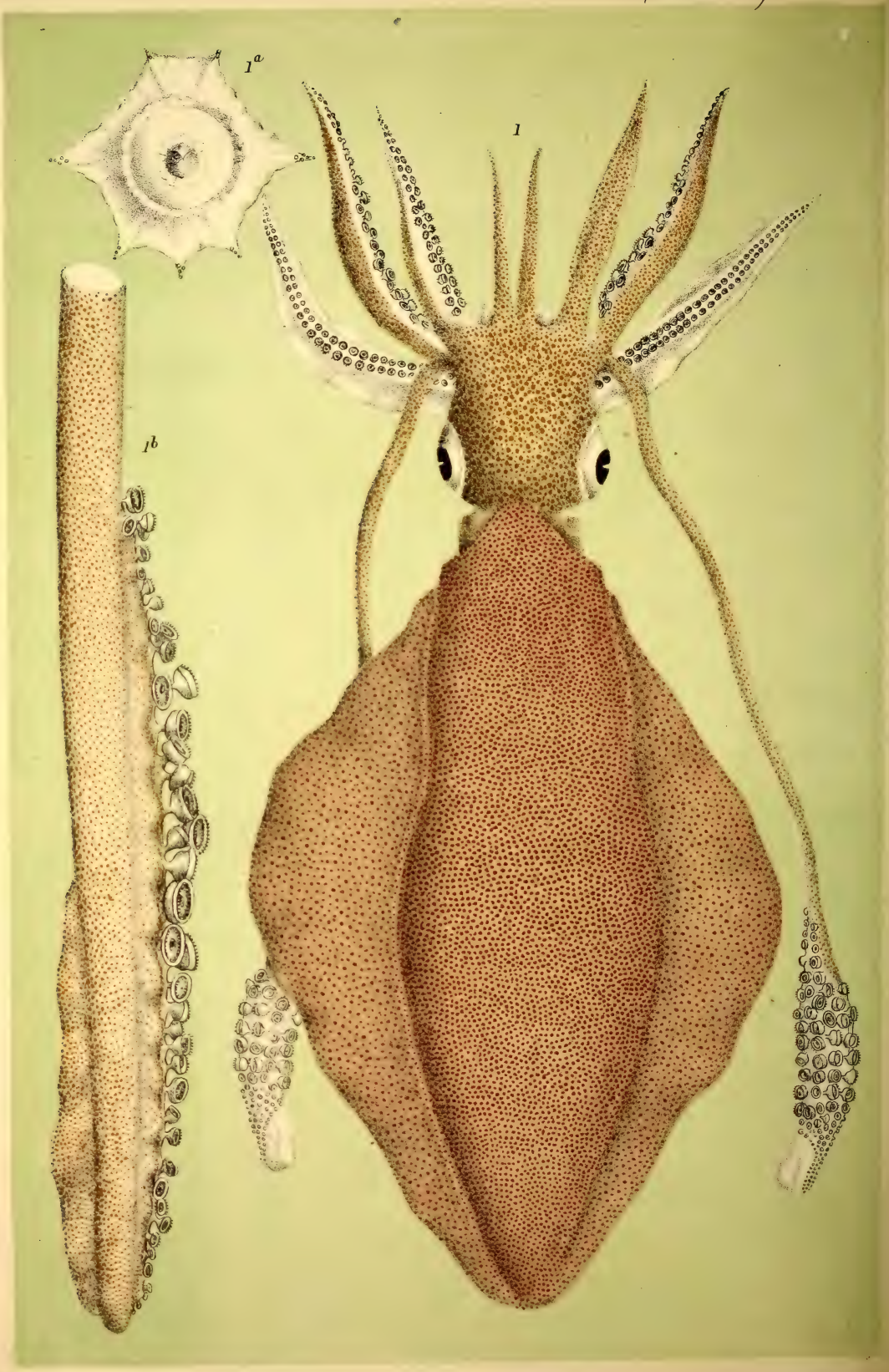

A. Bartholomew del. et lith.

Prof. M.c Coy direx.t

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PLATES 76 AND 77.

SEPIOTEUTHIS AUSTRALIS (QUOY AND GAIM.).

THE AUSTRALIAN TOOTH-CUPPED CUTTLEFISH.

[Genus SEPIOTEUTHIS (FÉR.). (Sub-kingd. Mollusca. Class Cephalopoda. Sub-class Antipedia. Order Sephinia. Fam. Loligidæ.)

Gen. Char.—Body oblong, sub-cylindrical, moderately depressed; fins extending nearly the length of the body on sides of back; suspending cartilaginous buttons on ventral surface linear, cervical ridge linear; head large; buccal membrane with seven salient angles; six buccal aquiferous openings; external ear with a prominent transverse crest; sessile arms conical, tapering, unequal, usually with narrow marginal fins; suckers in two rows. Tentacular arms long, cylindrical, with a club-shaped distal end having four rows of suckers with a narrow membranous fin on each side, and one on the compressed back; siphuncle supported by two dorsal triangular membranes at base. Shell, internal, horny, as long as the back, lanceolate, narrow in front, with a central keel.]

DESCRIPTION.—Body sub-cylindrical, tapering, with very broad, thick, fleshy, ovato-rhombic fins extending nearly the entire length of the mantle from beyond the posterior apex to within a short distance of the anterior edge, equalling the width of the body in the middle; anterior edge of mantle separated from the head all round, projecting in two rounded acute angles on the ventral aspect, corresponding with the internal, cartilaginous ridges, and projecting in one central, rounded point on the nape; funnel large, with a distinct valve and two strong, cartilaginous channels at ventral aspect of lateral base, with two triangular, suspensory membranes on dorsal side at base; sessile arms having the dorsal pair shortest, the next longer, the next longest, and the ventral pair equalling the second dorsal ones in length, each having two rows of pedunculated cups with horny, toothed margins; each arm connected by a very slight web at base about two lines wide; the first or smallest dorsal arms rounded on the back without webs; second pair rounded on the back, with a web two lines wide on each side not reaching to the base; the third pair are largest, compressed, keeled, with narrow web bordering the suckers; fourth or anterior pair rounded, with thick lateral webs, broader on outer side. *Colour:* Whole back, body and fins, vinous brownish-red with darker dots and small spots, the under-side of the body similarly coloured on the sides, but with paler smaller spots on the middle; under-side of lateral fins milk-white; head and outer-side of arms spotted like the back, but lighter and browner than the back, not so vinous or reddish in tint; inner-side of the arms, cups, and buccal membrane, and parts about the mouth milk-white; the eyes have a silvery-white iris about four lines wide, surrounded by a band, one line wide, of rich bronze yellowish-brown, beyond which is five or six lines wide of rich brown dotting, darker than head. Length of body, exclusive of head, 1 foot 3 inches; width across middle of body and lateral fins 11 inches; length of tentacular arms 1 foot 4 inches from base to tip; the cupped distal expansion is 5 inches long and 7 lines wide, stem 4 lines wide; length of dorsal pair of arms 4 inches, next pair 5 inches, next pair 6 inches 3 lines, fourth or anterior pair 5 inches; eye 2 inches in diameter; diameter of cups on tentacular arms 3 lines. Internal shell (or pen) of the colour and consistence of a goose-quill, extending the whole length of mantle, total length 1 foot $1\frac{1}{2}$ inches; the anterior 5th forming a narrow parallel-sided stem 3 inches long and 7 lines wide, with an obtusely-angular anterior end; posterior $\frac{4}{5}$ths oval, gradually widening to

about the middle, and rather more rapidly tapering to the posterior point; the inflexion forming the medial keel 3 lines wide; greatest width of pen 2 inches.

Cups with slender peduncles, horny margins, with very numerous, close, acute teeth, all whitish; the cups on the clubbed part of tentacular arms in four rows at the middle and three rows towards the end; on eight sessile arms in two rows; on the seven salient angles of the buccal membrane varying from 3 to 5 small cups in one or two rows.

Tentacular arms with a broad thin membranous band 5 lines wide, extending about $2\frac{1}{2}$ inches from the base, and having a thicker, narrower web on compressed keel on back of cupped expansion, and one on each side of the rows of cups.

External ears with prominent fleshy crests. Beaks black.

Reference.—Quoy and Gaimard, Voy. Astrol. Zool. ii. 77, t. 4, f. 1.

The enormous eyes of this Cuttlefish (as big as those of a calf in the specimen figured) roll about in their sockets in a way so suggestive of a vertebrate animal of the higher types, and give such an air of bright, energetic intelligence and activity to this fierce, predaceous creature, that it is difficult for an observer, unacquainted with its structure, to realise the fact of its belonging to so lowly a division of the animal kingdom as the Mollusca. It is one of the rarer Cuttlefishes of our Bay, the specimen described and figured having been obtained during the submarine blasting operations for removing rocks from the channels within the Heads, near Queenscliff. The anterior end of the internal pen or shell is more angular, and the widening behind is more gradual or less abrupt, than in Quoy and Gaimard's outline; the whole substance of the pen is thin and flexible, without thickening at the edges, and even the keel or midrib is only an inflexion, rounded on one face and hollow on the other.

Locality.—Not uncommon in Port Phillip Bay.

Explanation of Figures.

Plate 76.—Fig. 1, view of under-side, reduced to one-third the natural size, showing the funnel, mouth, and buccal membrane. Fig. 1*a*, side view of funnel, showing internal valve, suspensary ligaments, and one of the lateral cartilaginous buttons for supporting the edge of the mantle, Fig. 1*b*, internal dorsal pen, one-half the natural size (posterior end up).

Plate 77.—Fig. 1, dorsal view, one-third the natural size. Fig. 1*a*, buccal membrane, one-half the natural size, showing the beaks in the middle, and the irregular clusters of small suckers at angles. Fig. 1*b*, side view of end of one of the long tentacular arms, natural size, showing the toothed and pedunculate cups, and the dorsal and lateral fins or crests.

Frederick McCoy.

ZOOLOGY OF VICTORIA

(Polyzoa)

J. Ripper del. et lith. *Prof. M^c Coy direxit* *Steam Litho. Govt. Printing Office.*

Plate 78, Fig. 1.

BUGULA ROBUSTA (P. McGill.).

[Genus BUGULA (Oken). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-order Cheilostomata. Fam. Bicellariidæ.)
Gen. Char.—Cells bi-multiserial, closely contiguous; aperture very large, directed forwards; the margins not at all or very slightly thickened.]

Description.—Cells biserial, contracted below, upper and outer angle produced into a short, hollow, conical process; aperture oval, not extending to the base; a large, capitate avicularium on the lower part of the cell, below and to the outer side of the aperture.
Reference.—P. H. MacGillivray, Trans. Roy. Soc. Victoria 1869.

Western Port.

The only specimen I have seen forms a tuft, of a greyish-brown color, nearly two inches high. It is readily distinguished by the large size of the cells, with the upper and outer angles produced into the stout, conical processes, as well as the situation of the large avicularia.

Explanation of Figures.

Fig. 1, portion, natural size. Fig. 1*a*, small piece, magnified. Fig. 1*b*, back, magnified.

Plate 78, Fig. 2.

BUGULA CUCULLATA (Busk).

Description.—Polyzoary arranged in a spiral or turbinate form; cells biserial, elongated; upper and outer angle produced into a pointed spine, below which there is a smaller spine projecting also upwards and outwards; inner angle nearly square or prolonged into a minute spine; aperture occupying about two-thirds of the front of the cell; avicularia capitate, at the outer and lower part of the cell; ovicell large, saucer-shaped (when dry).
Reference.—Busk, Journal of Microscop. Science, 1867, p. 241.

Queenscliff; Portland, Mr. Maplestone.

Forms elegant tufts, two or three inches high. The cells are usually in small branches, forming fan-shaped tufts, spirally

arranged round the axis. The aperture occupies about two-thirds of the front, and the edge is prolonged into two short spines, the upper one at the extreme angle being the larger ; the inner angle is nearly square or produced into a slight spine. The ovicells are large, in dry specimens cucullate or saucer-shaped, but said by Mr. Maplestone to be globular when alive.

EXPLANATION OF FIGURES.

Fig. 2, specimen, natural size. Fig. 2*a*, front view of portion, magnified. Fig. 2*b*, single cell, more highly magnified, showing ovicells and avicularium. Fig. 2*c*, back view of fragment, magnified.

PLATE 78, FIG. 3.

BUGULA DENTATA (LAMX.).

DESCRIPTION.—Cells biserial, elongated; three long, hollow spines at the upper and outer part of the aperture, and a single similar one at the inner angle; aperture occupying rather more than half of the front of the cell; avicularia large, articulated below and to the outside of the lower corner of the aperture.

REFERENCE.—Busk, Brit. Mus. Cat., Mar. Polyzoa, p. 46, pl. xxxv.

Queenscliff ; Hobson's Bay.

This species occurs in small tufts, of a dull-greenish or leaden colour, on piles, hulks, &c. It is at once recognised by the three long spines at and below the upper and outer angle of the aperture ; of these the lower is turned inwards, while the upper two project forwards or outwards. There is also a similar but smaller spine at the upper and inner angle. I have not seen the ovicells ; they are said to be blue.

Lamouroux describes his *B. dentata* as having only two spines, but I think there can be no doubt it is the species here described.

EXPLANATION OF FIGURES.

Fig. 3, fragment, natural size. Fig. 3*a*, front view, magnified. Fig. 3*b*, side of cell, showing an avicularium. Fig. 3*c*, back view, magnified.

PLATE 78, FIG. 4.

BUGULA AVICULARIA (PALL.).

DESCRIPTION.—Cells biserial, elongated, small; two spines at the upper and outer angle, and one at the inner; aperture occupying the greater part of the anterior surface; avicularia small, capitate, situated on the outer side, close to the margin of the aperture, and at about its middle; ovicell surmounting a cell, rounded, rather contracted below.

REFERENCE.—Busk, Brit. Mus. Cat., Mar. Polyzoa, p. 45, pl. liii.

Hobson's Bay, on piles and hulks.

There can, I think, be no doubt of the identity of this with the well-known European species. It may be distinguished by the small size of the cells, the number and form of the spines, the shape of the ovicells, and the situation of the avicularia.

EXPLANATION OF FIGURES.

Fig. 4, fragment, natural size. Fig. 4*a*, front view of portion, magnified. Fig. 4*b*, single cell, showing ovicell and avicularium, more highly magnified. Fig. 4*c*, side view of cell.

I am indebted to Dr. MacGillivray for the typical specimens and descriptions of the species of *Bugula* on this plate.

FREDERICK MCCOY.

(Insects)

A. Bartholomew del. et lith. Prof. M^c Coy direxit Steam litho. Govt. Printing Office

PLATE 79, FIGS. 1 AND 2.

ACROPHYLLA VIOLASCENS (LEACH SP.).

THE VIOLET-WINGED PHASMA.

[Genus ACROPHYLLA (GRAY). Sub-kingd. Articulata. Class Insecta. Order Orthoptera. Section Ambulatoria. Family Phasmidæ. Sub-fam. Pterophasmina.)

Gen. Char.—Body elongate, abdomen slender and cylindrical in the males, broader, fusiform and depressed in the females; ovipositor of female boat-shaped, keeled below, not exceeding the end of the abdomen; anal styles long, those of males often narrower than of females. Thorax long, cylindrical; mesothorax about three times as long as the prothorax, usually spined; metathorax shorter than the mesothorax. Head small, elongate, gibbous behind; antennæ long, setaceous, many jointed, pubescent in the males; eyes globose, prominent; three ocelli or none. Tegmina ovate, about half or one-third as long as the wings; wings moderate in both sexes, longer in the males. Legs long, slender (longer in the males), dentated, anterior pair largest, simple; femora narrow, not membranous, anterior pair notched on inner edge to fit head; hind tibiæ not strongly dentate within. Tarsi with 1st joint much longer than the others, the three next gradually diminishing, 5th longer than the 4th; claws strong, with large pad. Australia.]

DESCRIPTION.—*Male:* Colour: Dull-green, the anterior portion of tegmina and anterior margin of costal area bright-green; posterior of tegmina and costal area, abdomen, and femora yellowish-brown; membranous portion of hind wings violet-purple, with the veins of a stronger shade of the same colour. Mesothorax above, and under-side of meso- and meta-thorax rough, with close small granular tubercles. Anterior legs simple, femora of middle pair with two denticulated lateral ridges, and a median granular keel below; hind femora with two denticulate lateral ridges, the median angular ridge only slightly serrated, but with two large, slender, conical spines nearly as long as width of thigh, and dividing the length into thirds. First joint of tarsi nearly as long as all the others; antennæ 21-jointed slightly pubescent, anal styles moderate, flat, narrow. Length from base of antennæ to tip of abdomen (excluding anal styles) 3 inches 3 lines. Proportional measurements to length, taken as 100:—Length of head, $\frac{7}{100}$; antennæ, $\frac{30}{100}$; prothorax, $\frac{7}{100}$; mesothorax, $\frac{16}{100}$; metathorax, $\frac{13}{100}$; abdomen, $\frac{62}{100}$; width of abdomen, $\frac{5}{100}$; anal styles, $\frac{9}{100}$; tegmina, $\frac{12}{100}$; width of tegmina, $\frac{7}{100}$; length of one wing, $\frac{35}{100}$; width of costal area, $\frac{5}{100}$; greatest width of wing, $\frac{24}{100}$; length of anterior femora, $\frac{30}{100}$; of second pair, $\frac{21}{100}$; of hind femora, $\frac{25}{100}$; width of hind femora, $\frac{4}{100}$.

Female: Colour: Whole body, legs, tegmina, and costal area of wings bright pea-green, except the under-sides of the legs, which are dull reddish; membrane of wings pale rose pink, veins more strongly tinted with the same colour; a whitish or pinkish band along each side of mesothorax and metathorax below the keel of the wings; mesothorax rough with small granules, and with a narrow median keel, narrow in front; under-side of meso- and meta-thorax granular; antennæ short, 21-jointed, smooth; abdomen large, broad in the middle, tapering, granular, carinated; tegmina and costal area of wing broad ovate, wide in the middle, tapering to a distal point; anal styles moderately small; denticulation of two hind pairs of femora nearly as in the males, but smaller. Length from base of antennæ to tip of abdomen (excluding anal styles) 3 inches 2 lines. Proportional measurements to length, taken as 100:—Length of head, $\frac{9}{100}$; antennæ, $\frac{15}{100}$; prothorax, $\frac{6}{100}$; mesothorax, $\frac{15}{100}$; metathorax, $\frac{14}{100}$; abdomen, $\frac{65}{100}$; width of abdomen, $\frac{15}{100}$; anal styles, $\frac{10}{100}$;

tegmina, $\frac{14}{100}$; width of tegmina, $\frac{8}{100}$; length of one wing, $\frac{32}{100}$; width of costal area, $\frac{10}{100}$; greatest width of wing, $\frac{22}{100}$; length of anterior femora, $\frac{28}{100}$; second femora, $\frac{22}{100}$; hind femora, $\frac{24}{100}$; width of hind femora, $\frac{4}{100}$.

REFERENCE.— = *Phasma violascens*, Leach, Zool. Misc., v. 1, t. 9 (male) = *Diura roseipennis*, Gray, Ent. Aust., t. 7, f. 2 (female).

The Phasmæ of the genus *Acrophylla* generally have three ocelli on top of the head, but *A. violascens* has none; the great length of the mesothorax, compared with the prothorax, is very remarkable in these insects. The anal styles vary much in length and width in the tropical species, but are only very moderate and nearly alike in both sexes in *A. violascens*. The deep violet colour of the under-wings in the males is so curiously different from the rosy pink of the same part in the females that no one would guess they were sexes of the same species if it had not been a matter of observation beyond doubt; the carination of the mesothorax in the one sex and not in the other is a very unusual sexual difference. The yellow bases of the costal area and yellow stripes on abdomen of females, mentioned by Westwood, are only *post-mortem* appearances, not seen in life, or unless the tegmina after death be allowed to remain over the costal area, or the wings be allowed to rest for some time on the abdomen.

Not very uncommon at Oakleigh, near Melbourne.

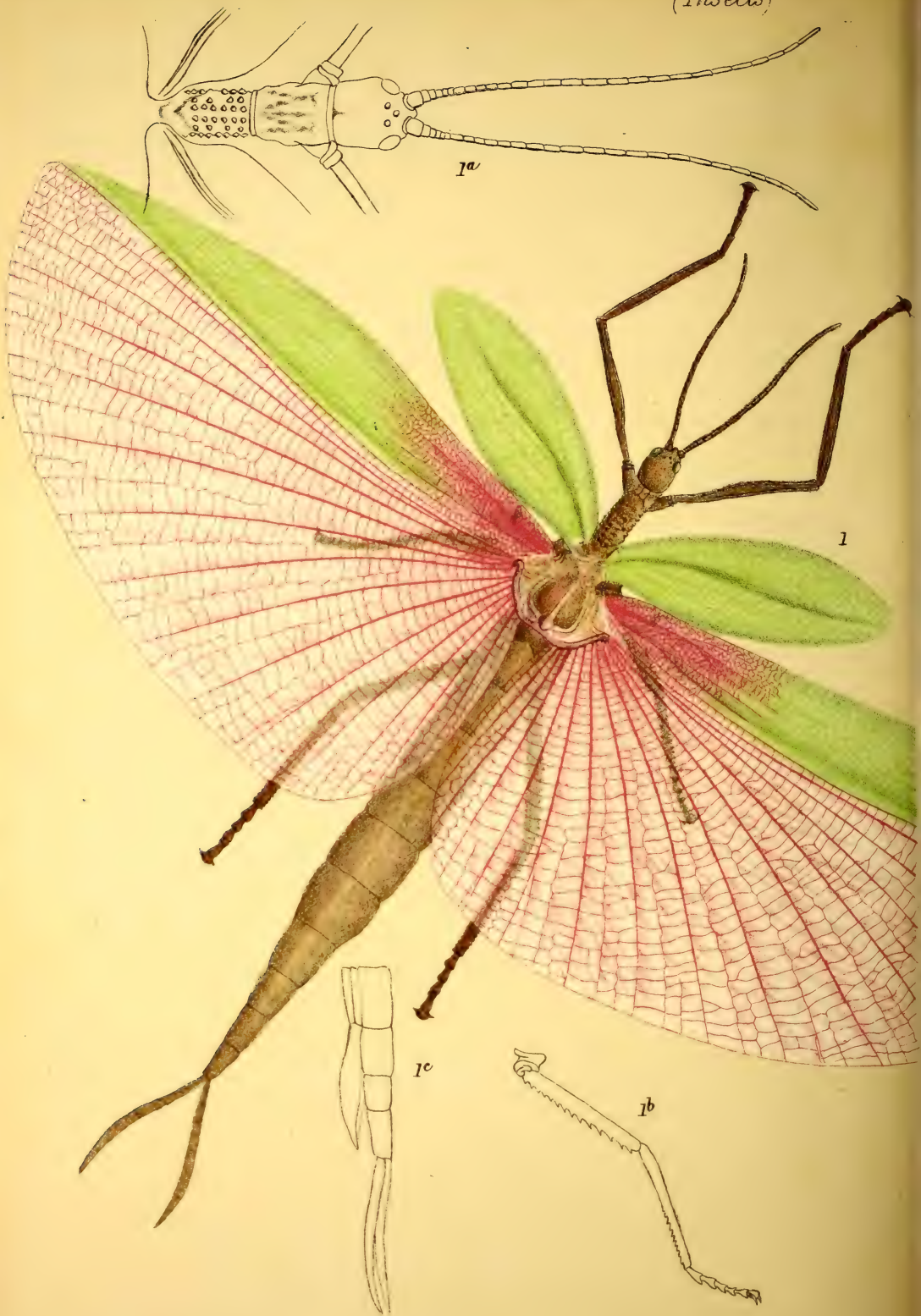
A large variety, 3 inches 6 lines long (male), with stouter legs and paler wings, occurs at Warragul, and females found therewith have the wings colourless; but they seem to be only local varieties.

EXPLANATION OF FIGURES.

PLATE 79.—Fig. 1, male specimen, flying, natural size. Fig. 1*a*, antennæ, head, prothorax, and mesothorax, magnified. Fig. 1*b*, hind leg, magnified, showing the large teeth. Fig. 1*c*, side view of posterior joints of abdomen, magnified. Fig. 1*d*, one of anal styles, further magnified; Fig. 1*e*, view of posterior end of abdomen, magnified, view from above. Fig. 2, female, natural size. Fig. 2*a*, ditto, antennæ, head, prothorax, and keeled mesothorax, magnified. Fig. 2*b*, ditto, hind leg, magnified. Fig. 2*c*, ditto, side view of hind segments of abdomen, magnified to show ovipositor. Fig. 3, *Podacanthus Typhon*, young specimen, with undeveloped wings, natural size; the left hind leg is shorter than that of the other side, and has only four joints in the tarsus, from having been lost and being in progress of restoration. (See Plate 80 for adult.)

FREDERICK McCOY.

(Insects)



A. Bartholomew del et lith. Prof. McCoy dirext Steam litho. Govt. Printing Office.

PLATE 80.

PODACANTHUS TYPHON (GRAY).

THE LARGE PINK-WINGED PHASMA.

[Genus PODACANTHUS (GRAY). (Sub-kingd. Articulata. Class Insecta. Order Orthoptera. Section Ambulatoria. Family Phasmidæ. Sub-fam. Pterophasmina.)

Gen. Char.—Body large, abdomen cylindrical, slender, truncated at tip, and biuncinate below in males; very thick, tapering to tip in females. Ovipositor large, boat-shaped, carinated below, pointed behind; styles very long, slender in both sexes, exceeding the length of the ovipositor in females. Head small, oblong, flat above, a little gibbous behind; eyes globular; three distinct ocelli on top of head. Antennæ long, filiform, 26-jointed and smooth in female, and one-third longer, pilose and of 23 joints in male. Mesothorax short, scarcely twice the length of the prothorax, narrow, rounded, spinose; metathorax longer than mesothorax, broad, oblong. Legs simple, of moderate length, thighs not membranous nor dilated, the two posterior pairs spinous below; the anterior pair notched on inner side for head, smooth; tarsal joints diminishing to the fourth, fifth long, claws large with large pad. Tegmina elongate, ovate, half length of wings in females, one-third length in males, reaching to about half the length of the abdomen; posterior wings very large, as long as abdomen, broadly rounded. Australia.]

DESCRIPTION.—*Female:* Tegmina, and distal half of costal area of under-wings, bright pea-green above; rather less than basal half of costal area above bright rosy-carmine; on the under-side the carmine extends along the anterior portion nearly three-fourths of the length from the base towards the tip, gradually fading into the bright pea-green of the lower and distal remainder of the area. Anterior basal portion of tegmina on the under-side pale-carmine, the remainder of the surface pea-green. Head, thorax, legs and abdomen pea-green, tinged with yellowish and pinkish on upper surface of abdomen, the tarsi, and tubercles of the mesothorax. Veins of the posterior part of lower wings rosy-carmine, with the membrane a paler shade of the same colour. Serratures of side of thorax and two posterior pairs of femora reddish. Tubercles of mesothorax irregular, conical. Head and prothorax and metathorax nearly smooth above; mesothorax and metathorax with a row of larger, more acutely pointed, tubercular spines. Two rows of small, sharp, subequal spines on the femora of the two posterior pairs of legs; anterior legs without spines. The midrib of the tegmina scarcely larger than the adjoining ones. Length from base of antennæ to end of abdomen, excluding the anal styles, 4 inches 6 lines to 5 inches 1 line. Proportional measurements to length, taken as 100 (in five specimens):—Length of head, $\frac{5-6}{100}$; antennæ, $\frac{27}{100}$; prothorax, $\frac{5-6}{100}$; mesothorax, $\frac{9-10}{100}$; metathorax, $\frac{19-20}{100}$; abdomen, $\frac{63}{100}$; width of abdomen, $\frac{10-12}{100}$; length of ovipositor, $\frac{16}{100}$; anal styles, $\frac{20}{100}$; tegmina, $\frac{37}{100}$; width of tegmina, $\frac{13}{100}$; length of one wing from base, $\frac{78-84}{100}$; greatest width of wing, $\frac{52}{100}$; width of costal area, $\frac{12}{100}$; length of anterior femora, $\frac{18}{100}$; width, $\frac{2}{100}$; length of 2nd femora, $\frac{14-15}{100}$; width, $\frac{2\frac{1}{2}}{100}$; length of hind femora, $\frac{20}{100}$; width, $\frac{2\frac{1}{2}}{100}$.

REFERENCE.—Gray, Ent. Aust. t. 2, f. 1.

This most beautiful *Phasma* is readily distinguished from the other two large species found near Melbourne, the *Tropidoderus rhodomus* and *T. iodomus*, figured in our Plates 69–70, by the beautiful rosy-pink colour of the membrane of the lower wings, with the bright rosy-carmine veins, and the same colour occupying as much of the basal portion of the costal area as can be covered over by the tegmina when at rest. It is also easily distinguished by the generic characters which separate the *Podacanthi* from the *Tropidoderi*, particularly the great length of the anal styles, the unkeeled tuberculated mesothorax, the three ocelli on the top of the head, and the undilated femora.

M. Serville, in his "Histoire Naturelle des Insectes, Orthoptères," p. 230, says that the antennæ of the females are longer than the thorax ; but in our specimens they but slightly exceed the metathorax and mesothorax taken together, without the prothorax. If the basal joint be counted, there are 27 joints in the antennæ, instead of 26, as given by Professor Westwood.

The number of spines on the hind legs varies, but is usually about a dozen.

I have not seen the males as yet, nor can I account for their apparent rarity.

Specimens are in the collection from the Richmond Paddock and other localities near Melbourne.

Explanation of Figures.

Plate 80.—Fig. 1, female, natural size, in flying position. Fig. 1*a*, ditto, antennæ, head with the three ocelli, prothorax, and mesothorax, magnified. Fig. 1*b*, ditto, side view of leg. Fig. 1*c*, ditto, side view of hind joints of abdomen, to show ovipositor.

(N.B.—The young, with imperfectly developed wings, is figured in the resting position on Plate 79, fig. 3, and in it the ocelli are not visible.)

Frederick McCoy.

By Authority : John Ferres, Government Printer, Melbourne.

CONTENTS OF DECADES.

N.B.—The originals of all the Figures are in the National Museum, Melbourne.

DECADE I.

PLATE 1.—The Black Snake (Pseudechys porphyriacus, Shaw sp.).
PLATE 2.—The Copper-head Snake (Hoplocephalus superbus, Günth.).
PLATE 3.—The Tiger Snake (Hoplocephalus curtus, Schl. sp.).
PLATE 4.—The Australian Bream (Chrysophrys Australis, Günth.).
PLATE 5.—The Spiny-sided Butterfly-Gurnard (Lepidotrigla Vanessa, Rich. sp.).
PLATE 6.—The Kumu Gurnard (Trigla Kumu, Lesson and Garn.).
PLATE 7.—The Australian Giant Earth-worm (Megascolides Australis, McCoy).
PLATE 8.—Lewin's Day-moth (Agarista Lewini, Boisd.).
The Loranthus Day-moth (Agarista Casuarinæ, Scott).
The Vine Day-moth (Agarista Glycine, Lewin sp.).
PLATE 9.—Pieris (Thyca) Harpalyce (Don. sp.).
PLATE 10.—Pieris (Thyca) Aganippe (Don. sp.).

DECADE II.

PLATE 11.—The Little Whip Snake (Hoplocephalus flagellum, McCoy). The White-lipped Snake (Hoplocephalus coronoides, Günth.).
PLATE 12.—The Death Adder (Acanthophis Antarctica, Shaw sp.).
PLATE 13.—The Carpet Snake (Morelia variegata, Gray).
PLATE 14.—The Gippsland Perch (Lates colonorum, Günth.).
PLATE 15.—The Murray Lobster (Astacoides serratus, Shaw sp.).
PLATE 16.—The Salmon Arripis (Arripis truttaceus, Cuv. sp.). Adult.
PLATE 17.—Ditto of the younger forms and coloring.
PLATE 18.—The Horse Mackerel (Trachurus trachurus, Lin. sp.).
PLATE 19.—The Small-scaled Rock Cod (Lotella callarias, Günth.).
PLATE 20.—The Australian Rock Cod (Pseudophysis barbatus, Günth.).

DECADE III.

PLATE 21.—The Sea-Leopard Seal (Stenorhynchus leptonyx, de Blainv. sp.).
PLATE 22.—The Yellow-sided Dolphin (Delphinus Novæ Zealandiæ, Quoy and Gaim.).
PLATE 23.—The Common Brown Snake (Diemenia superciliosa, Fisch.).
The Small-scaled Brown Snake (Diemenia microlepidota, McCoy).
The Shield-fronted Brown Snake (Diemenia aspidorhyncha, McCoy).
PLATE 24.—Catenicella margaritacea (Busk).—C. plagiostoma (Busk).—C. ventricosa (Busk).—C. hastata (Busk.)—C. rufa (McG.).—C. cribraria (Busk).—C. alata (Wyv. Thomson).—C. lorica (Busk).—C. formosa (Busk).—C. elegans (Busk).—C. perforata (Busk).—C. Buskii (Wyv. Thomson).—C. Hannafordi (McG.).—C. crystallina (Wyv. Thomson).—C. carinata (Busk).—C. aurita (Busk).—C. geminata (Wyv. Thomson).—C. cornuta (Busk).—C. intermedia (McG.)
PLATE 25.—Membranipora membranacea (Linn. sp.).—M. perforata (McG.).—M. ciliata (McG.).—M. mamillaris (McG.).—M. umbonata (Busk).—M. pilosa (Linn. sp.).—M. cervicornis (Busk).
PLATE 26.—Membranipora dispar (McG.).—M. Woodsii (McG.).—M. lineata (Linn. sp.).—M. Rosselii (Audouin sp.).—M. Lacroixii (Savigny sp.).
PLATE 27.—The Australian Rockling (Genypterus Australis, Cast.).
The Yarra Blackfish (Gadopsis gracilis, McCoy).
PLATE 28.—The Southern Mackerel (Scomber pneumatophorus, De la Roche).
PLATE 29.—The Yabber Crayfish (Astacoides bicarinatus, Gray sp.).
PLATE 30.—The Large Wattle Goat-Moth (Zeuzera Eucalypti, Boisd. Herr.-Schæf.).

DECADE IV.

PLATE 31.—The Australian Sea-Bear or Fur-Seal (Euotaria cinerea, Péron sp.).
PLATE 32.—The Two-hooded Furina-Snake, Furina bicucullata (McCoy).
PLATE 33.—The Banded Red Gurnet-Perch (Sebastes percoides, Solander sp.).
PLATE 34.—The Angel-fish (Rhina squatina, Lin. sp.).
PLATE 35.—Lepralia circinata (McG.).—L. Cecilii (Aud.).—L. diaphana (McG.).—L. marsupium (McG.).—L. subimmersa (McG.).—L. anceps (McG.).—L. Maplestonei (McG.).
PLATE 36.—Lepralia vittata (McG.).—Membranipora perforata. Lepralia Brogniartii (Aud.).—L. elegans (McG.).—L. pertusa (Esper. sp.).—L. Malusii (Aud. sp.).—L. lunata (McG.).
PLATE 37.—Lepralia ciliata (Linn. sp.).—L. trifolium (McG.).—L. cheilodon (McG.).—L. canaliculata (McG.).—L. larvalis (McG.).—L. diadema (McG.).—L. papillifera (McG.).—L. Ellerii (McG.).
PLATE 38.—Lepralia monoceros (Busk).—L. excavata (McG.).—L. vitrea (McG.).—L. megasoma (McG.).—L. Schizostoma (McG.).—L. Botryoides (McG.).—L. ferox (McG.).—L. pellucida (McG.).
PLATE 39.—Crisia Edwardsiana (D'Orb. sp.).—C. biciliata (McG.).—C. acropora (Busk).—C. setosa (McG.).—C. tenuis (McG.).
PLATE 40.—Saunders' Case-Moth (Metura elongata, Saunders sp.).
The Lictor Case-Moth (Entometa ignobilis, Walk.).

DECADE V.

PLATE 41.—The Lace Lizard (Hydrosaurus varius, Shaw sp.).
PLATE 42.—The Spotted Marsh-Frog (Limnodynastes Tasmaniensis, Günth.).—The Common Sand-Frog (Limnodynastes dorsalis, Gray).
PLATE 43.—The Carpet Shark (Crossorhinus barbatus, Lin. sp.).—The Seven-gilled Shark (Notidanus [Heptanchus] Indicus, Cuv.).
PLATE 44.—The Barracouta (Thersites atun, Cuv.).—The Tunny (Thynnus Thynnus, Lin. sp.).
PLATE 45.—Flustra denticulata (Busk).—Carbasea episcopalis (Busk).—C. dissimilis (Busk).—C. indivisa (Busk).—C. elegans (Busk).—C. pisciformis (Busk).
PLATE 46.—Spiralaria florea (Busk).—Diachoris Magellanica (Busk).—D. spinigera (P. McGil.).—Dimetopia spicata (Busk).—D. cornuta (Busk).—Didymia simplex (Busk).—Calwellia bicornis (Wyv. Thomson).
PLATE 47.—Dictyopora cellulosa (P. McGil.).
PLATE 48.—Eschara obliqua (P. McGil.).—E. dispar (P. McGil).—E. gracilis (Lamx.).—E. platalea (Busk).—E. quadrata (P. McGil.)—E. mucronata (P. McGil.).—Caleschara denticulata (P. McGil.).
PLATE 49.—Cellaria fistulosa (Linn.).—C. hirsuta (P. McGil.).—C. tenuirostris (Busk.).—C. gracilis (Busk).—Nellia oculata (Busk).—Tubucellaria hirsuta (Busk).
PLATE 50.—The Great Black, or Manna Cicada (Cicada mœrens, Germ.).—The Great Green Cicada (Cyclochila Australasiæ, Donov. sp.).

DECADE VI.

PLATE 51.—The Victorian Rhodona (Rhodona Officeri, McCoy).
PLATE 52.—The Black and White Ringed Snake (Vermicella annulata, Gray).
PLATE 53.—The Green and Golden Bell-Frog (Ranoidea aurea, Less. sp.).
PLATES 54–55.—The Australian Aulopus (Aulopus purpurisatus, Rich.).
PLATE 56.—The Hammer-headed Shark (Zygæna malleus, Shaw).—The Common Australian Saw-Fish (Pristiophorus nudipinnis, Günth.).
PLATE 57.—Biflustra perfragilis (McGil.).—B. delicatula (Busk).
PLATE 58.—Cellularia cuspidata (Busk).—Menipea crystallina (Gray sp.).—M. cyathus (Wyv. Thomson).—M. cervicornis (McGil.)—M. tricellata (Busk).—M. Buskii (Wyv. Thomson).
PLATE 59.—Bicellaria tuba (Busk).—B. grandis (Busk).—B. ciliata (Linn).—B. turbinata (McGil.).—Stirparia annulata (Map.).—Bugula neritina (Linn.).
PLATE 60.—Steganoporella magnilabris (Busk. sp.).—Petralia undata (McGil.).

DECADE VII.

PLATE 61.—The Tuberculated Argonaut (Argonauta oryzata, Meusch.).
PLATE 62.—The same seated in its so-called shell or Paper-Nautilus.
PLATE 63.—The Blue-spotted Eagle-Ray (Myliobatis Australis, Macleay).
PLATE 64.—The Long-toothed Bull-Shark (Odontaspis taurus, Raf.).—The Australian Tope Shark (Galeus Australis, Macleay).
PLATE 65.—The Leafy Sea-Dragon (Phyllopteryx foliatus, Shaw sp.).—The Short-headed Sea-horse (Hippocampus breviceps, Pet.)
PLATE 66.—Dictyopora grisea (Lamx. sp.).—D. albida (Kirch.)—(Var. avicularis, P. McGill.).
PLATE 67.—D. Wilsoni (P. McGill.).
PLATE 68.—Idmonea Milneana (d'Orb.).—I. contorta (P. McGill.).—I. radians (Lamk.).
PLATES 69–70.—The Violet-shouldered Phasma (Tropidoderus iodomus, McCoy).—The Red-shouldered Phasma (Tropidoderus rhodomus, McCoy).

Natural History of Victoria.

PRODROMUS

OF THE

ZOOLOGY OF VICTORIA;

OR,

FIGURES AND DESCRIPTIONS OF THE LIVING SPECIES OF ALL CLASSES

OF THE

VICTORIAN INDIGENOUS ANIMALS.

DECADE IX.

BY

FREDERICK McCOY, F.R.S.,

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M DCCC LXXXIV

PREFACE.

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It having been considered desirable to ascertain accurately the natural productions of the Colony of Victoria, and to publish works descriptive of them, on the plan of those issued by the Governments of the different States of America, investigations were undertaken, by order of the Victorian Government, to determine the Geology, Botany, and Zoology of the Colony, to form collections illustrative of each for the public use, and to make the necessary preparations for such systematic publications on the subject as might be useful and interesting to the general public, and contribute to the advancement of science.

As the geological and botanical investigations have already approached completion, and their publication is far advanced, it has been decided to now commence the publication of the third branch completing the subject, namely, that of the Zoology or indigenous members of the different classes of the animal kingdom.

As the Fauna is not so well known as the Flora, it was a necessary preliminary to the publication to have a large number of drawings made, as opportunity arose, from the living or fresh examples of many species of reptiles, fish, and the lower animals, which lose their natural appearance shortly after death, and the true characters of many of which were consequently as yet unknown, as they had

only been described from preserved specimens. A Prodromus, or preliminary issue, in the form of Decades, or numbers of ten plates, each with its complete descriptive letterpress, will be published, of such illustrations as are ready, without systematic order or waiting for the completion of any one branch. The many good observers in the country will thus have the means of accurately identifying various natural objects, their observations on which, if recorded and sent to the National Museum, where the originals of all the figures and descriptions are preserved, will be duly acknowledged, and will materially help in the preparation of the final systematic volume to be published for each class when it approaches completion.

This ninth Decade gives figures and descriptions in the first plate of an interesting Lizard, a variety of the *Physignathus Lesueri*, from the Gippsland Rivers, for specimens of which I am indebted to that indefatigable man of science, Mr. Warden Howitt. It is this rarely-seen creature which has given rise to the rumor that Crocodiles inhabited the almost inaccessible rivers in which it is found.

The second and third plates figure one of our River Tortoises, generally called the Murray Turtle.

The fourth plate shows the beautiful Murray Golden Perch of its natural colors for the first time.

The fifth and sixth plates give the chief varieties and details of natural coloring for the first time of our famous Murray Cod-Perch.

The seventh plate gives the colored representation for the first time of our commonest Dog-fish, the Australian Smooth-Hound.

The eighth plate represents the strange form of the Thresher, or Long-tailed, or Fox, Shark, obviously identical with the European examples, and one of rare occurrence amongst the Sharks of our seas.

The two following plates continue the illustrations of our Polyzoa contributed by Dr. MacGillivray to the National Museum and this work.

The succeeding Decades will illustrate as many different genera as possible, and will deal first usually with species of some special interest, and of which good figures do not exist, or are not easily accessible.

FREDERICK MCCOY.

11th December 1882.

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PLATE 81.

PHYSIGNATHUS LESUERI (GRAY),

VAR. HOWITTI (McCOY).

THE GIPPSLAND WATER LIZARD.

[Genus PHYSIGNATHUS (CUVIER). (Sub-kingd. Vertebrata. Class Reptilia. Order Sauria. Sub-order Pachyglossæ. Tribe Strobilosaura. Family Agamidæ.)

Gen. Char.—Head pyramidal, quadrangular, greatly swollen at the parotid sides of the angle of the jaws; covered with very small, subequal, polygonal, keeled plates; rostral angle raised into a superciliary ridge; nostrils lateral, near tip of snout; ear-drum large, on a level with the surface. Four incisors and six longer, arched, pointed, laniary teeth on each side in upper jaw, with thirteen shorter, triangular molars. Tongue wide, thick, spongy, slightly narrow and notched at tip; skin of throat extended to form a small dew-lap; a V-shaped transverse fold between the neck and the chest. Neck, body, and tail compressed and with a crest of erect, compressed scales as far as middle of tail, which is two-thirds of the total length. Scales of the body rhomboidal, scarcely imbricated, in transverse rows, of very unequal sizes. Toes widened by a border of broad scales on each side, projecting horizontally. Femoral pores distinct.]

DESCRIPTION.—Form elongate, tapering; neck and body moderately compressed, angular along the back; tail very much compressed; serrated crest of moderately arched, triangular scales along mid-line of back from nape to near middle of tail, beyond which there are two smaller parallel crests with a narrow hollow between them to the tip; head with small, polygonal, elongate, obtusely keeled or angulated plates on top, those near tip of snout a little larger than those behind; an ovate space over each eye, bounded internally by an arched line of erect scales, larger than the others of the head, is covered by minute hexagonal scales about half the size of those on the middle of the top of the head; a nearly vertical arched ridge of strong scales over each eye at angle of head; eyelids covered with very small plates; each lip with 12 large marginal, flat, smooth plates; a few rows of large smooth scales extending from the chin nearly to the ear; chin plate pentagonal or nearly triangular; rostral plate hexagonal, about twice as wide as high; an irregular row of large conical tubercular plates on side of cheek, and about 9 vertical irregular rows extending from the dorsal crest nearly to the belly, each about as wide as 3 of the adjacent plates; occiput with numerous small conical polygonal tubercles, and one small flat oval occipital plate. Ear large, round. Tail strong at base, strongly compressed and tapering to a very slender posterior extremity, the single dorsal crest extending to rather less than half of its length, after which the crest is doubled. Scales under the chin smooth, convex, rhomboidal; those on the pouch and under the neck strongly keeled, the keel ending in a point directed backwards; ventral

scales quadrate, with a slight keel, obsolete on many of them; over the neck small conical tubercles with compressed summit; scales on sides of neck keeled, rhomboidal, with posterior angle forming a straight spine; scales of sides of body and upper part of tail in vertical bands of little quadrate tubercles, each with a keel, most prominent at the posterior angle; not imbricated; amongst these the irregular vertical rows of three-sided spinous tubercles with wide rounded base; scales of legs strongly keeled, except on under-side of thighs and legs, where they are smooth, large on front of thighs, small behind, moderate elsewhere; a few much larger, rhomboidal, more strongly keeled plates among the others; scales of sides of tail in vertical bands, and so strongly keeled as to form conspicuous longitudinal ridges. *Color:*—Entire upper surface and sides of head, body, and toes dark-olive (sometimes with a brownish upper skin, below which the dark color is seen), with a row of 20 large rounded jet-black spots along the dorsal crest, those of tail extending downwards as dark-olive bands separated by narrow, much lighter bands; a dark band from eye to ear, which it encloses with a jet-black patch, another round black spot over the shoulder; pouch irregularly marked with broad longitudinal bands of dark indigo-blue and the richest cadmium yellow; breast and belly blackish in figured specimen, but dirty yellow with occasional small black flecks in other individuals; sides of head light-olive; a few irregular black spots on head and back and sides.

MEASUREMENTS.

	Queensland Specimen.	Gippsland Specimen.	Gippsland Specimen.
	Ft. ins. lines.	Ft. ins. lines.	Ft. ins. lines.
Length from snout to end of tail	3 1 0	2 5 0	2 5 6
„ „ nostril	0 0 4	0 0 4	0 0 4
„ „ anterior edge of orbit ...	0 1 0	0 0 11	0 0 11
„ „ „ „ ear ...	0 2 3	0 2 1	0 2 0
Diameter of ear-drum	0 0 3	0 0 3	0 0 3
Length from snout to anterior limb	0 4 9	0 4 0	0 3 10
„ „ posterior limb	0 10 0	0 8 0	0 8 2
Length of body	0 11 0	0 9 0	0 9 3
„ tail	2 2 0	1 8 0	1 9 3
„ head	0 2 9	0 3 0	0 2 10
Width across superciliary ridges	0 1 0	0 1 2	0 1 2
Length of anterior limb from shoulder to end of longest toe	0 4 9	0 3 5	0 3 9
„ posterior limb to end of longest toe ...	0 8 3	0 6 9	0 6 10
„ free portion of inner anterior toe and claw	0 0 8	0 0 6	0 0 6½
„ „ second „ „	0 0 11	0 0 10	0 0 10
„ „ third „ „	0 1 3	0 1 1	0 1 0
„ „ fourth „ „	0 1 4	0 1 1½	0 1 0
„ „ outer „ „	0 0 11	0 0 9	0 0 9
„ anterior toe and claw of hind foot ...	0 1 3	0 0 6	0 0 6
„ second „ „ ...	0 1 2	0 0 10	0 0 11
„ third „ „ ...	0 1 7	0 1 4	0 1 3
„ fourth „ „ ...	0 2 0	0 2 4	0 1 8
„ posterior toe and claw of hind foot ...	0 1 4	0 1 2	0 1 2
Greatest depth of body	0 2 9	0 2 2	0 2 0
„ width „	0 2 6	0 2 3	0 2 3
Depth of base of tail	0 1 6	0 1 3	0 1 5
Width „	0 1 4	0 1 1	0 1 2
Depth at middle of tail	0 0 8	0 0 8	0 0 9
Width „	0 0 6	0 0 5	0 0 4
Depth at end of tail	0 0 1½	0 0 1½	0 0 1½
Width „	0 0 1	0 0 1	0 0 1
Height of highest scales of dorsal crest on nape ...	0 0 3	0 0 3	0 0 3
„ „ at base of tail	0 0 3	0 0 2	0 0 1½
„ „ at middle of tail	0 0 2½	0 0 2	0 0 2
where doubled	0 0 1	0 0 1	0 0 0½

MEASUREMENTS—*continued.*

	Queensland Specimen. Ft. ins. lines.	Gippsland Specimen. Ft. in. lines.	Gippsland Specimen. Ft. ins. lines.
Diameter of large spinose scales on sides of body	0 0 1½ ...	0 0 1½ ...	0 0 1
Number of rows of scales in 3 lines at middle of body	Five ...	Five ...	Six
Number of scales in 3 lines at anterior part of top of the head lengthwise	Five	...Three to four	Three & a half
„ „ in the supraorbital patches	Ten lengthwise, fourteen across	Six lengthwise, ten across	Seven lengthwise, ten across
„ „ between supraorbital patches	Eight lengthwise, eleven across	Four lengthwise, eight across	Five lengthwise, eight across
„ „ in middle of belly ...	Three ...	Five ...	Five
Length of chin plate	0 0 3 ...	0 0 3 ...	0 0 2½
Width of same at upper base	0 0 3 ...	0 0 3 ...	0 0 3
Height of rostral plate	0 0 1⅓ ...	0 0 2 ...	0 0 2
*Width of same	0 0 4 ...	0 0 3½ ...	0 0 3½

REFERENCE.—*Lophura Lesueri* (Gray), Syn. Rept. in Griffith ed. of Cuv. Anim. Kingd. v. 9, p. 60 = *Istiurus* id. (Duméril and Bibron), Erpt. Gén. v. 4, p. 384, t. 40 = *Physignathus* id. (Gray), Cat. Liz. B. M. = *Amphibolurus heterurus* (Peters), Monatsberichte der Königlich Preuss. Akad. der Wissenschaften zu Berlin 1866, p. 86.

The bladder-like inflation of the hinder part of the head near the hind angle of the jaws, from which the genus derives its name, is very striking in these aquatic Lizards, which inhabit rivers, in which they swim well, from the wide expansion or horizontal fringe of scales on the sides of the long stout toes.

The larger conoidal scales form irregular rows on the sides of the head and vertically across the sides of the body and base of tail, amongst the greatly more numerous ordinary small ones.

The only difference I observe between this and the typical *P. Lesueri* of Queensland is the greater width in proportion to the height of the rostral plate in the Queensland one ; and the supercocular group of scales being about one-half the size of the others on the anterior part of the top of the head, instead of being only ⅓ or ¼ the size, as Peters states ;† and as it is improbable that such creatures would have so great a geographical range as to be common to Gippsland and Queensland, with such an enormous space between the rivers, I name the variety or probable species after that excellent geologist, magistrate, and bushman, my accomplished friend Mr. A. Howitt, who, with his multifarious and laborious duties, in so difficult a country to traverse, is always ready

* These measurements are, in each of the three specimens, taken across, the points of the compass touching each lateral suture; if measured in two halves from centre to each lateral suture along the curved surface, the Queensland one measures five lines and the two Victorian four lines each.

† "Die Supraorbitalschuppen sind auffallend klein, 3 bis 4 Mal kleiner als die Schuppen des Vorderkopfes."

and willing to aid in any scientific investigation of the natural products of Gippsland, and who with infinite difficulty succeeded in procuring three specimens for me of this River-Lizard. The proverb that "Cows far off have long horns" is ludicrously exemplified in the case of this Lizard, which has apparently given rise to the rumors of Crocodiles having been seen in Gippsland; a country so rugged and overgrown with forests and almost impenetrable scrub that it is an extremely rare occurrence for a white man to reach the habitat in which the *Physignathus* is found, in the upper reaches of the Buchan River.

Explanation of Figures.

Plate 81.—Fig. 1, side view, one-half natural size. Fig. 1*a*, side view of head, natural size. Fig. 1*b*, top view of head, natural size (the scales of the supraorbital patches too small). Fig. 1*c*, scales of belly, twice natural size. Fig. 1*d*, scales of sides of body, magnified twice. Fig. 1*e*, scales of side of tail, magnified two diameters. Fig. 1*f*, hind foot, natural size, to show projecting scales of edge of toes. Fig. 1*g*, section of tail before doubling of dorsal crest. Fig. 1*h*, section of tail after doubling of dorsal crest. Fig. 1*i*, scales of throat, magnified two diameters. Fig. 1*k*, rostral and chin plates, natural size. Fig. 2, rostral and chin plates of Queensland specimen to show the difference of proportion of the rostral.

Frederick McCoy.

D.J. Wild del. et lith.

Prof. M.c Coy dir.ex.t

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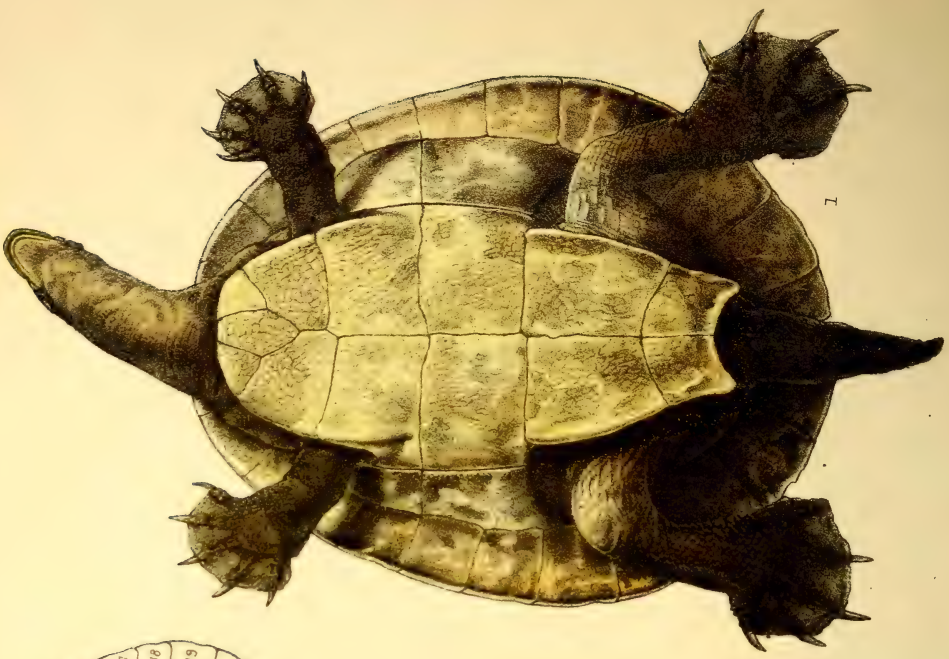
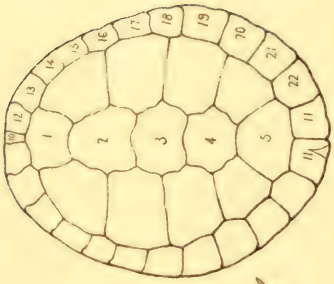
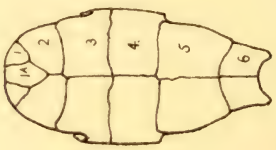
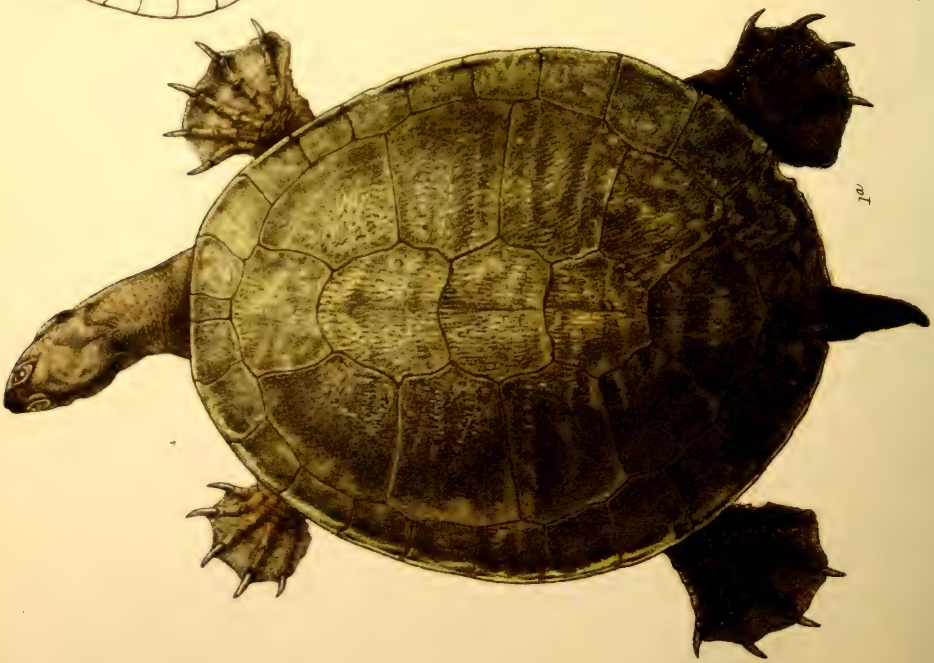








Plates 82 and 83.

CHELYMYS MACQUARIA (Cuv. sp.).

The Murray Tortoise.

[Genus CHELYMYS (Gray). (Sub-kingd. Vertebrata. Class Reptilia. Section Cataphracta. Order Chelonia. Sub-ord. Pleuroderes. Fam. Chelydidæ. Sub-fam. Hydraspidinæ.)
Gen. Char.—Carapace moderately convex, solid, ovate, wide behind, side edges slightly turned up; nuchal shield distinct; internal cavity contracted in front to half the width of the outer opening by two internal diverging septa; vertebræ sharply keeled within; sternum solid, narrow, anterior and posterior ends bent slightly upwards, with broad sides reflected upwards at an obtuse angle, and a wide angular notch behind between the anal plates; intergular plate marginal. Head moderate, flat, covered by a thin, smooth skin, reticulated so as to form small irregular plates on the temples; no zygomatic arch; ear-drum large, round; jaws naked, horny, strong; neck long, with a granular skin; two small conical barbels under the chin. Feet with wide web between the toes; claws long, acute, five on the anterior feet, four on the posterior feet, the hind posterior toe having no claw. Australia.]

Description.—Shell ovate, moderately convex, with a slight longitudinal, very narrow sulcus along the middle of the 2nd, 3rd, and 4th vertebral shields,* interrupted at their edges; 1st vertebral plate equal to the 5th, but shorter than the others, large, four-sided, narrowed and concave behind, touching the nuchal, first marginal, and half of second marginal plates, in front, outer sides slightly convex; 2nd, 3rd and 4th obscurely hexagonal, with waving lateral margins, the 2nd plate longest; 5th plate widest behind, where it touches the caudal and half the last lateral plate on each side; nuchal plate narrow, oblong, one-third longer than wide; all the other marginal plates gradually widening towards the posterior end from the 4th, which is smallest, very slightly inclined upwards, forming a shallow concavity outside the convexity of the sides of the carapace behind the anterior limbs to the caudal plates, which are nearly on a level with the nuchal one, all the intervening lateral plates being a little below their level; the five posterior ones with a slight notch in the middle of each, and sometimes at the suture along the edge. Vertebral, costal, and marginal plates rugged, with narrow, irregularly reticulating, vermiform, impressed grooves, chiefly longitudinal in direction. Plastron or sternum narrow, semi-oval, and wider in front than behind, the sides sloping upwards at an obtuse angle; gular plates triangular, smaller than the intergular plate which separates them on the margin. Reticulation of the skin forming polygonal plate-like spaces on the temples; top of the head covered with thin smooth skin; jaws naked; skin of anterior legs with the granules between the reticulations of the skin larger and more plate-like than on the neck. A row of long, arched, narrow, transverse scales on the anterior edge of the leg, and a row of seven or eight not transversely elongated on the posterior edge. Posterior limb with more regularly-plated granulation than the anterior, with a distinct row of 6 or 8 large transversely enlongated plates on the posterior margin.
Color:—The whole of the upper surface dark brownish-olive; whole of the under surface dull brownish and greenish yellow, irregularly netted with impressed grooves, but without dark margins or spots. Skin of neck moderately granular, reticulated, of a blackish-olive tint, a pale-yellow streak extending from the edges of the jaws across the lower edge of the ear a variable distance along each side of the neck.

* The diagrams on Plate 83, figures 2 and 3, identify the different shields and plates referred to.

MEASUREMENTS.

	Largest Female, from Junct. M. & D.	More convex, from Goulburn.	Female, from Wahgunyah.	Smaller sp., Wahgunyah.	Wahgunyah.	Young, Wahgunyah.	Male, from junct. of Murray and Darling.
	in. lines	in. lines	in. lines	in. lines	in. lines	in. lines	in. lines
Length of carapace	11 3	10 0	9 6	8 10	7 6	5 1	9 6
Greatest width	9 0	7 9	7 8	7 4	6 6	4 4	7 0
Depth from middle of sternum to middle of carapace	3 9	3 4	4 0	3 0	2 6	1 6	3 3
Length of nuchal plate	0 9	0 8	0 7	0 7	0 8	0 6	0 9
Width „ „	0 6	0 5	0 4	0 3	0 3	0 2	0 3½
Outer margin of 1st lateral plate ...	1 0	0 11	0 11	0 9	0 9	0 5	1 0
„ 2nd „	1 3	1 1	1 1	0 10	0 11	0 6	1 0
„ 3rd „	1 3	1 1	0 11	0 11	0 9	0 5½	1 0
„ 4th „	1 4	1 1	1 2	1 0	0 9	0 6	1 0
„ 5th „	1 3	1 1	1 1	1 0	0 9	0 6	1 1
„ 6th „	1 3	1 1	1 2	1 1	0 10	0 6	1 1
„ 7th „	1 5	1 2	1 3	1 3	0 11	0 7	1 2
„ 8th „	1 5	1 2	1 3	1 3	1 0	0 7½	1 2
„ 9th „	1 6	1 3	1 3	1 3	1 0	0 9	1 2
„ 10th „	1 5	1 3	1 2	1 1	1 0	0 9	1 1
„ 11th „	1 4	1 2	1 0	1 1	0 10	0 9	1 1
„ caudal plates	1 3	1 2	1 0	1 1	0 11	0 8	1 2
Length of 1st vertebral plate	1 9	1 7	1 8	1 3	1 1	0 8	1 5
Greatest width at front	2 9	2 4	2 1	1 8	1 10	1 2	2 1
Width behind	1 8	1 5	1 3	1 1	1 1	0 9	1 4
Length of 2nd vertebral plate	2 5	2 0	2 0	1 8	1 5	0 11	1 11
Greatest width at middle	2 10	2 0	1 10	1 8	2 1	1 8	2 1
Length of 3rd vertebral plate	1 11	1 8	1 9	1 6	1 6	0 9	1 9
Greatest width	2 9	2 1	2 0	1 10	2 1	1 9	2 4
Length of 4th vertebral plate	2 0	1 10	1 8	1 6	1 3	0 10	1 6
Greatest width	2 7	1 11	1 9	1 11	1 10	1 7	2 0
Length of 5th vertebral plate	1 9	1 8	1 5	1 7	1 3	0 11	1 8
Greatest width behind	2 8	2 5	2 3	2 1	1 7	1 2	2 1
Width of front margin	1 1	0 8	0 9	0 9	0 9	0 7	0 9
Length of neck from front edge of carapace to occiput	2 9	1 6	1 8	1 6	1 6	1 4	2 1
Diameter at middle	1 5	1 4	1 4	1 2	1 1	0 7	1 2
Length of head	2 1	1 10	2 0	1 6	1 6	1 0	1 10
Greatest width at hind margin of ear ...	1 5	1 3	1 6	1 1	1 1	0 9	1 3
Greatest depth	1 2	1 2	1 2	1 0	0 10	0 7	1 0
Length of anterior limb	3 3	2 10	1 6	1 7	1 9	1 0	2 9
„ longest toe without claw ...	1 1	0 10	0 9	0 11	0 8	0 5	1 1
„ claw	0 7	0 5	0 5	0 3	0 4	0 3	0 4
„ posterior limb	4 7	3 2	2 5	2 10	2 6	1 7	3 5
„ longest toe without claw ...	1 6	1 3	1 5	1 1	0 11	0 8	1 4
„ claw	0 8	0 6	0 6	0 6	0 5	0 3	0 6
„ tail from posterior end of plastron	2 10	1 10	2 3	2 5	2 1	0 10	3 9
„ intergular plate	1 5	1 2	1 1	1 0	1 1	0 9	1 3
Greatest width „	1 1	0 10	0 7	0 9	0 6	0 4	0 8
Width at margin „	0 6	0 6	0 6½	0 6	0 3	0 2½	0 3½
Gular plates at outer margin	1 3	1 1	0 11	0 11	0 11	0 6	0 11
Outer margin of humeral plate	1 5	1 2	1 2	1 0	0 10	0 6	1 2
Length of anal plates at outer margin ...	1 4	1 2	1 0	1 1	1 0	0 8	1 0
Width of plastron across ends of caudal plates	2 1	1 10	1 4	1 5	1 2	0 9	1 7
„ „ „ posterior outer angles of gular plates ...	2 9	2 5	2 2	2 1	1 9	1 1	2 0

REFERENCE.—*Emys Macquaria*, (Cuv.), R. A., v. 2, p. 11 = *Hydraspis Australis*, (Gray), in Grey Jour. Exped. N.W. and W. Australia, v. 2, p. 445, t. 6 = *Platemys Macquaria*, (Dum. et Bib.), Erp. Gén., v. 2, p. 438.

Although popularly called the Murray Turtle by the colonists, the structure of the feet is that proper to the walking Tortoises, and not the exclusively swimming paddles of the true Turtles.

This species varies very much in the rugosity of the upper plates and in the depth of the shell; some of the same age and sex being much smoother and flatter than others. The males usually are narrower and deeper or more convex, thicker and more rugose, than the females, and with larger tails. The young are more nearly orbicular, and with the notches in the posterior marginal plates very much deeper and more conspicuous than in the adults, and with, of course, the shields covering the shell very much thinner. The above series of measurements of specimens shows that the proportion of length to width of the vertebral plates also varies greatly in specimens otherwise perfectly alike, the 4th vertebral plate being sometimes as long as wide, and sometimes nearly twice as wide as long. The upper surface of the carapace is uniformly of a very dark-brownish or blackish-olive; the marbling with grey which is mentioned by older writers only appearing in dried specimens; the under-side of the sternum is always of a nearly uniform yellow-ochre tint, becoming of a more greenish or brownish hue towards the marginal plates, but without dark margins or spots; the skin is uniform blackish, except the edges of the jaws and the streak from them along the sides of the neck and touching the lower edge of the ear-drum, which is yellow.

The size of the granules on the skin of the neck varies considerably also, irrespective of other characters. The so-called beards or barbels are two minute, soft, retractile, conical tubercles or papillæ, very likely to be overlooked, as when retracted they only leave a smooth oval spot. The presence or absence of this so-called beard cannot be taken as a character of generic value with advantage, as it varies so much, like the other appendages of the skin.

These Mud-Tortoises can scarcely be said to differ generically from the South American *Platemys* and *Hydraspis*, the two barbels under the chin being really present in all the specimens if carefully looked for, and the slightly more distinct plating of the temples

with small polygonal shields constituting a very slight ground for generic distinction.

The eggs have a strong white calcareous shell, of a slightly ovate form, very little wider at one end than the other, bluntly rounded at each end ; about 1 in. 7 lines long and 1 in. 1 line in greatest diameter ; another specimen is 1 in. 8 lines long and 1 in. 1 line in diameter, being a little longer and proportionately narrower.

Very common in the River Murray and its branches, the Darling, Goulburn, &c., from which a great number of specimens of various ages and sizes are in the Museum. It is not found in the rivers flowing south into the sea on the Victorian coast. The specimen figured is one of average size from the Goulburn.

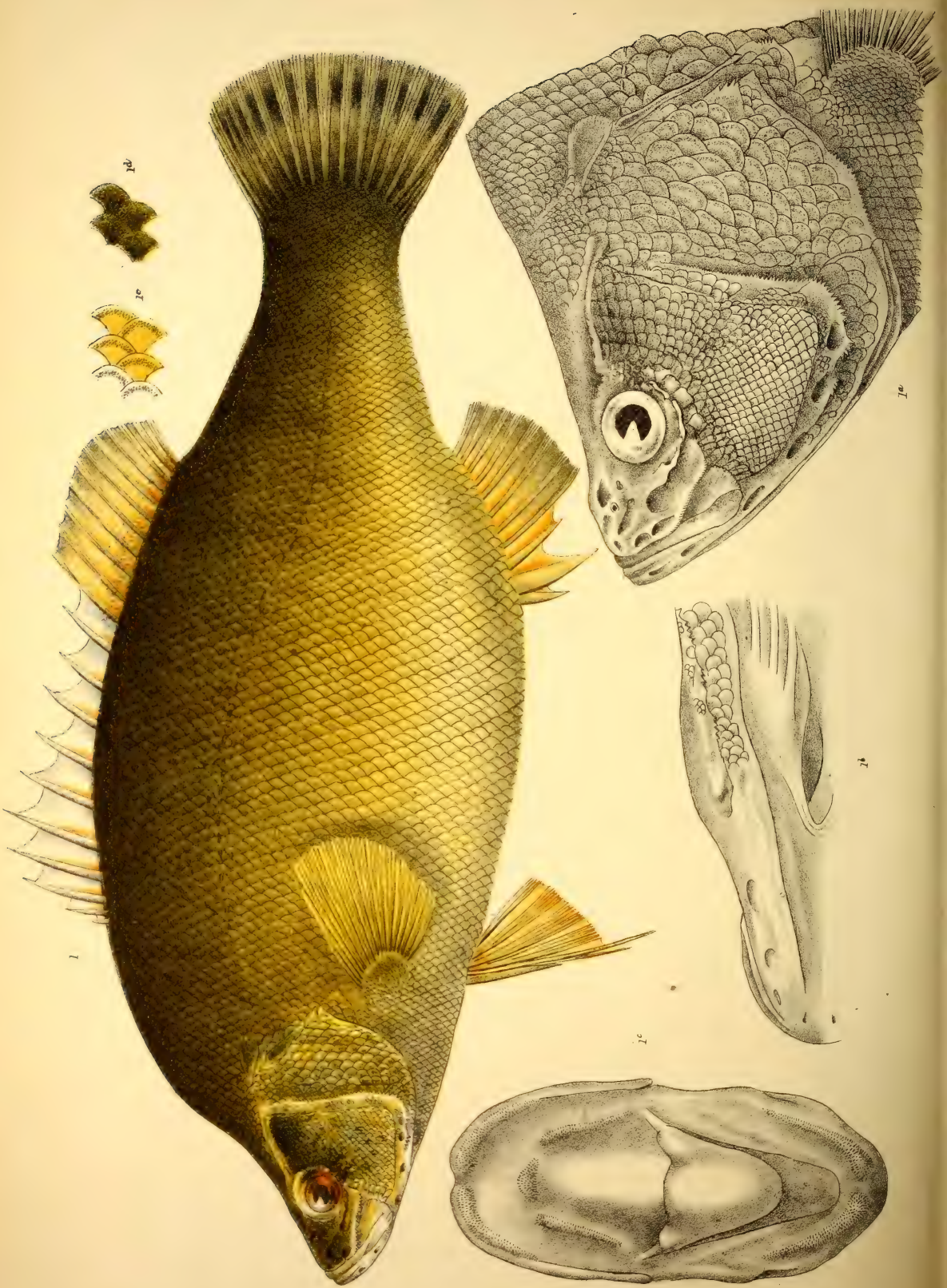
Although so common, no recognisable figure has been published before.

EXPLANATION OF FIGURES.

PLATE 82.—Side view, one-half natural size.

PLATE 83.—Fig. 1, ventral view, one-third natural size. Fig. 1*a*, same specimen, dorsal view. Fig. 2, diagram of plates of carapace; 1 to 5, vertebral plates; 10, nuchal plate ; 11, caudal plates ; 12 to 22, marginal plates. Fig. 3, diagram of plates of plastron or sternum ; 1, gular plates ; 1*a*, intergular ; 2, humeral ; 3, pectoral ; 4, abdominal ; 5, femoral ; 6, anal plates.

FREDERICK McCOY.



A. Bartholomew del et lith.

Prof. McCoy dirext.

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PLATE 84.

CTENOLATES AMBIGUUS (RICH. SP.).

THE MURRAY GOLDEN PERCH.

[Genus CTENOLATES (GÜNTH.). (Sub-kingd. Vertebrata. Class Pisces. Sub-class Teleostii. Order Acanthopterygii. Fam. Percidæ.)

Gen. Char.—Spinous dorsal of ten rays, continuous with the soft dorsal. Branchiostegals, seven; pseudobranchiæ distinct. Teeth villiform, in bands on the jaws and palate bones and vomer. Tongue smooth. Preoperculum finely serrated on straight posterior edge, with larger and less regular denticles directed slightly forwards in groups on undulated inferior edge. Lower edge of preorbital finely serrated. Scales of moderate size, finely serrated on posterior edge. Australia.]

DESCRIPTION.—Ovate; greatest depth under anterior part of dorsal, about twice and a half in the total length of the fish, excluding the caudal fin. Head cavernous, a row of 6 or 8 large mucous pits extending on each side of lower jaw and preoperculum, a few also larger ones above the preorbital plate. Length of the head slightly less than one-third of the total length, without caudal fin. Thickness about half the depth. Dorsal profile very convex from dorsal fin to occiput, concave from thence to end of snout, the concavity of profile greatest in large specimens, and above the occiput. Lower jaw slightly longer than upper, the maxillary reaching, when the mouth is closed, to a little behind the vertical from the anterior part of the orbit. Diameter of the eye one-half of the length of the snout, and one-fourth to one-fifth of the post-orbital length of the head, according to the age. Upper part of the head smooth and naked; cheeks covered with small scales, about half the size of those on the operculum. Denticles on lower edge of preoperculum in three or four rounded groups, directed forwards. Operculum with one strong triangular spine, little behind tip of soft posterior angle, with a second one a little in front of it on upper edge, sometimes broken into several little denticles, and a third, smaller one, about half way between angle and upper base. Spines of dorsal thick, strong, the 5th and 6th longest; 1st branched ray of dorsal exceeding last spinous ray by about one-half of its length; last branched ray about one-fourth more than the length of the last spine. The basal third of the dorsals covered with small scales. Caudal and pectoral rounded. 1st ventral ray lengthened. Three anal spines, very thick, the 1st little more than half the length of the 2nd. *Fin-rays:* Dorsal, 10 spinous, 11 branched; pectoral, 17; ventral, 1 spinous, 5 branched; anal, 3 spinous, 8 branched (last two with one base); caudal, 15 to 17, with 3 or 4 short rays above and below. *Scales:* Along the lateral line, about 82; above, 14 to 16; below, 29 to 32. The posterior edge of the coracoid (*a*) above the base of the pectoral, and of the suprascapular (*b*) above operculum, finely denticulated. *Color:* Purplish on top of head; sides of head with mixtures of green, purple, and yellow; back, rich yellowish bronze-green; sides, golden-yellow, fading into whitish on lower margin; scales of back and sides minutely speckled with black; spinous dorsal fin pale-purplish, the rays tawny-yellow, minutely dotted with black; soft dorsal, blackish towards edge; pectorals yellowish, the rays minutely dotted with black, membrane nearly colorless; ventral fins, membrane yellowish, rays orange; caudal, with the

membrane brownish-purple, minutely dotted with black; anal, membrane purplish, rays dull orange, the hinder portion blackish towards margin. Iris golden-yellow, with an inner pearly-white ring, with reddish and purplish marks outside.

MEASUREMENTS OF TWO SPECIMENS.

	Ft. ins. lines.	Ft. ins. lines.
Total length to end of caudal	1 11 0	1 10 0
Length of head to end of operculum	0 6 0	0 5 6
„ from tip of snout to anterior edge of orbit	0 1 6	0 1 6
Diameter of orbit	0 0 8	0 0 8
Length from tip of snout to end of preoperculum	0 3 9	0 3 6
„ „ base of pectoral	0 6 0	0 5 10
„ „ „ ventral	0 6 9	0 6 4
„ „ first anal spine	1 2 0	0 11 5
Greatest depth	0 8 0	0 6 8
„ thickness	0 3 10	0 3 4
Length of pectoral	0 3 3	0 3 1
„ spine of ventral	0 1 9	0 1 5
„ 1st soft ray	0 3 7	0 3 2
„ 2nd „	0 2 7	0 2 6
„ 1st anal spine	0 0 11	0 0 10
„ 2nd „	0 1 8	0 1 9
„ 3rd „	0 1 5	0 1 6
„ 1st branched ray	0 2 4	—
„ 1st dorsal spine	0 0 5	0 0 8
„ 2nd „	0 1 0	0 1 3
„ 5th „	0 1 10	0 2 0
„ 10th „	0 1 2	0 1 3
„ 1st branched ray	0 1 11	—
„ caudal fin	0 2 4	0 2 4
Number of scales in one inch, about middle	Four	Five

REFERENCE.— = *Datnia* (?) *ambigua*, Rich., Voy. Ereb. and Ter., t. 19 = *Dules auratus*, Castlenau, P.Z.S. Vict., vol. 1, p. 55 = *Ctenolates Macquariensis*, Günth., P.Z.S. 1871, t. 33.

The largest specimens are deeper in proportion to the length than the smaller, and have a more concave profile; and the eye, as usual, is smaller in proportion than in the younger ones.

This beautiful fish is much esteemed for the table, and is commonly about 3lbs. or 4lbs. weight. An enormous specimen, of which the dimensions are given in the first column, weighed 8¾lbs.

Dr. Richardson counts only six branchiostegal rays in his dried specimens, but there are seven in the fresh fish; and I think there can be no doubt of the correctness of the synonyms above quoted. The last anal ray by some may be counted as two, being divided to the base; and the number of scales counted along the lateral line depends very much on where you cease to count the small posterior ones; so these differences, which induced Count Castlenau to propose a new specific name, I think unimportant.

The gullet is wide ; the stomach with a wide blunt cæcum ; the pyloric appendages about eleven in number, and $\frac{3}{4}$ of an inch long ; the intestines with two turns. The swim-bladder is excessively thin, club-shaped, and about $1\frac{1}{2}$ inches wide. Liver bilobed.

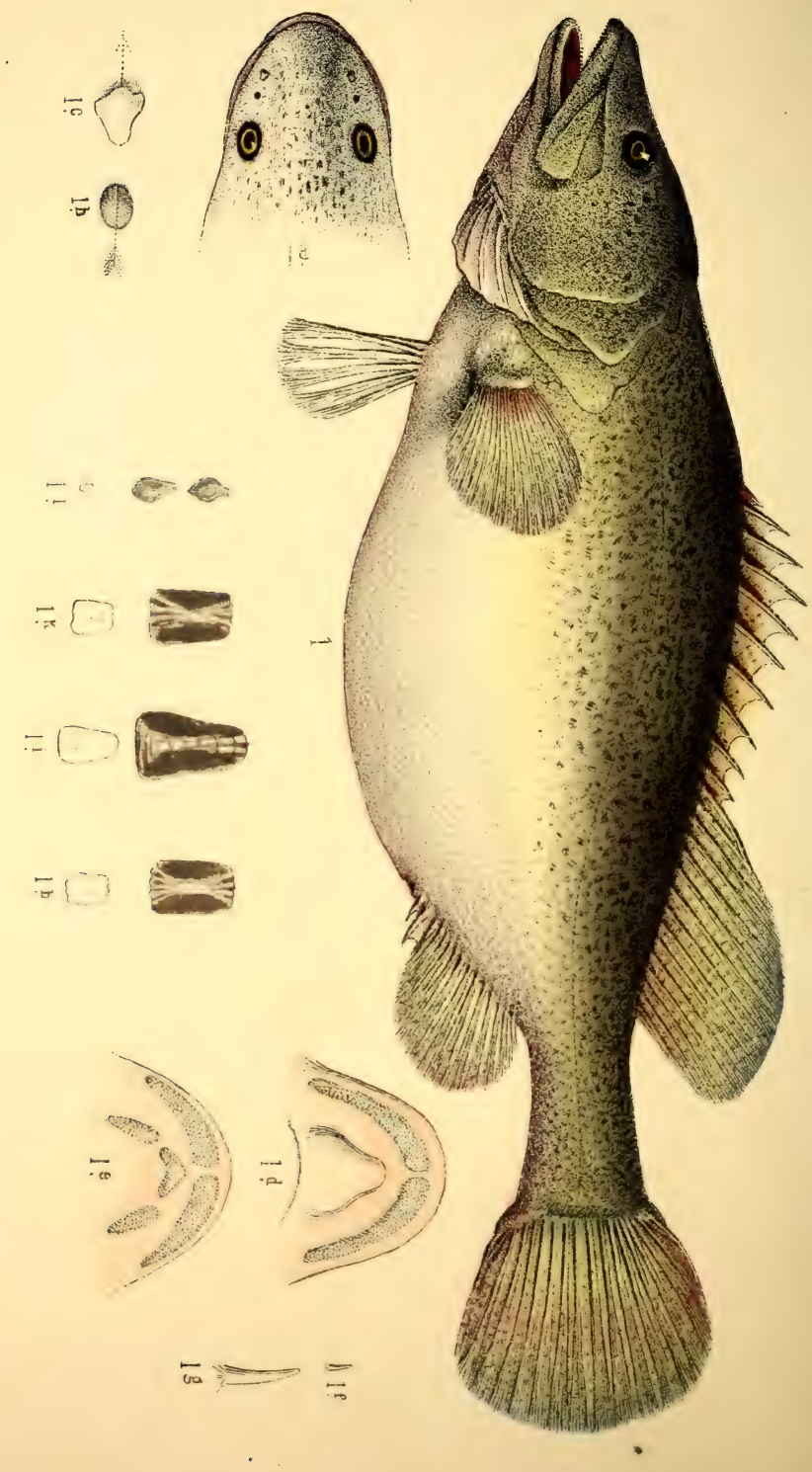
The general hue, like the fashionable color "old gold," is a most striking and beautiful characteristic of this fish, when fresh, distinguishing it from the many other Murray-River fish with which it comes plentifully to the market, and well warranting its popular name amongst the colonists of "Golden Perch." It has not been figured of its natural colors before.

Common in the River Murray and its branches, but not found in any river of Victoria flowing southwards to the sea.

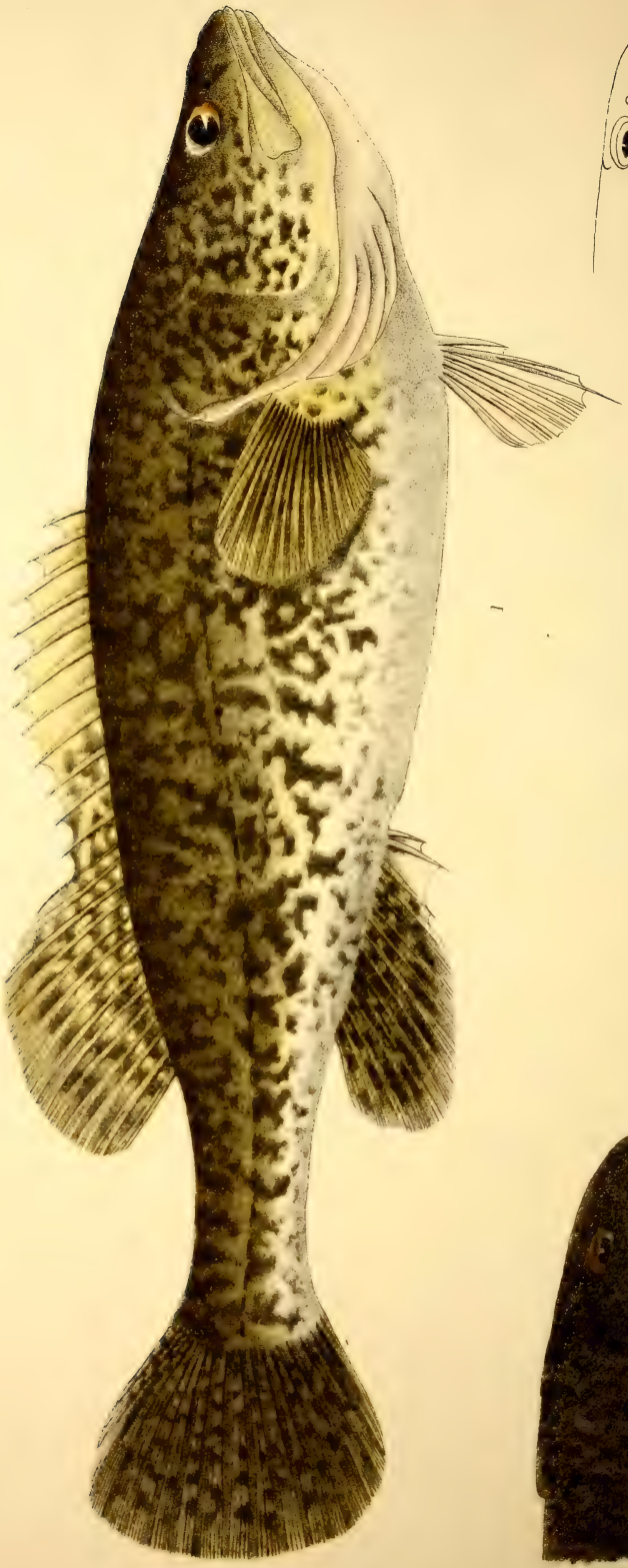
Explanation of Figures.

Plate 84.—Fig. 1, side view, one-half the natural size. Fig. 1*a*, head, natural size of average specimen, to show the serratures of the hind edge of the preoperculum, preocular plate, and the groups of denticles directed forwards on the lower margin of the preoperculum, and large mucous pits on side of snout. Fig. 1*b*, portion of one side of under jaw to show the large mucous pits, natural size. Fig. 1*c*, inner view of mouth, natural size, showing the smooth tongue and the crowded rows of small teeth on the jaws, palatine bones, and vomer. Fig. 1*d*, olive scales near back, above lateral fin, natural size, to show coloring. Fig. 1*e*, yellow scales of sides below lateral line, natural size.

Frederick McCoy.



Ludwig Becker del & lith. *Prof. M'Coy, direx.* *Hamel & Co imp.*



PLATES 85 AND 86.

OLIGORUS MACQUARIENSIS (CUV. AND VAL. SP.).

THE MURRAY COD-PERCH.

[Genus OLIGORUS (GÜNTHER). (Sub-kingd. Vertebrata. Class Pisces. Sub-class Teleostii. Order Acanthopterygii. Fam. Percidæ.)

Gen. Char.—Branchiostegal rays seven. Teeth in villiform bands on the jaws, vomer, and palatine bones. No canines. Tongue smooth. One dorsal fin, with eleven spinous rays in front of the branched ones. Anal fin with three spines in front. Operculum with one point; sub-operculum with a smooth or obtusely denticulated edge. Scales very small. Pyloric cæca few. Australian rivers.]

DESCRIPTION.—*Form:* Regular elongate ovate, moderately compressed; greatest depth of body $4\frac{3}{4}$ times in total length to end of caudal fin in small specimens (a foot and a half long), but only $3\frac{1}{2}$ times in large individuals; thickness of body $\frac{5}{6}$ths of the depth. Edges of operculum, preoperculum, and suboperculum nearly smooth. One obscure spine a little within the margin and rounded posterior point of the operculum. Edge of the preoperculum with a slight undulation or imperfect dentation on the posterior margin and angle (perceptible only when dry). *Fin Rays:* Dorsal, 11 spinous and 15 branched; anal, 3 spinous and usually 12 or very rarely 13 branched; pectoral, 18 to 20 (usually 19), branched; ventral, 1 spinous and 5 branched, the anterior part of first branched ray considerably longer than the others; caudal, 20 (9 above and 11 below the middle). *Scales:* Along lateral line, 106 to 180; above lateral line at middle of body, 23 to 35; below lateral line, 38 to 70. *Color:* Ground color a yellowish-olive, becoming whitish on belly, and blackish on top of head and back, more grey in large old specimens; covered, except on belly, with dusky variable spots, very small, extremely numerous, and nearly equal in large old fish, much larger, fewer, and grouped in irregular angular cloudy clusters about half an inch or so long in smaller young examples; fins dark-olive with a purplish tinge and often red at the margins, except the ventrals, which are nearly white; anterior part of top of head blackish, without spots. Pancreatic cæca of pylorus, about 3.

REFERENCE.—= *Grystes Macquariensis* (Cuv. and Val.), v. 3, p. 58; *id.*, Rich., E. and T. Fish, p. 118, t. 53, f. 8, 9; = *G. Peeli* (Mitchell), Exp. Austr., t. 6, f. 1.

This great Cod-Perch is well known under the popular name of "Murray Cod" from its great abundance in the Murray River, and

some fancied resemblance to a Cod, to which it has no affinity and little likeness. It is by far the largest of all our fresh-water fish, and is in request for the table all the year round. It sometimes reaches 100lbs. in weight, and examples of 40lbs. are common. It feeds voraciously on fish and crustacea ; twenty full-grown specimens of the smaller Murray Crayfish *(Astacopsis bicarinatus)* were taken from the stomach of the specimen figured in our Plate 85, which measured three feet four and a half inches in length. The color varies considerably, the very large specimens being greyish with a slight, dull, greenish tinge above, but whitish on the belly; the dusky spots being very small and excessively numerous ; while in the smaller specimens the spots are always much larger, and frequently clustered in angular patches, as in our Plate 86 ; these smaller specimens are more decidedly yellowish-olive in the ground color.

There is a very common opinion among the fish dealers and other observers that there are two distinct species confounded under the name of Murray Cod, the one with a narrow snout, and the other with a broadly-rounded blunt one, and it is easy to separate the two forms when a heap of the fish is sorted. I am convinced, however, that the difference is sexual, and that the two forms agree precisely in all the other proportions, the number of fin-rays, and in the number of scales along the lateral line and above and below it, as well as in coloring. The depth of the body I find also varies from $3\frac{1}{3}$ in the large to about $\frac{1}{5}$ in the small examples in the total length. The length of the orbit in the moderately large specimen (No. 1 of table of measurements given below) is contained about 9 times in the length of the head ; in the next (No. 2) 8 times ; in the next (No. 3) $7\frac{1}{2}$; in the next (No. 4) 7 times ; in the smallest (No. 5) about 5 times ; and in the largest (No. 6) it is contained about $10\frac{1}{2}$ times ; bearing out the remark I have made, in relation to other fish, that the proportionate size of the eye is always larger in young or small individuals, and is gradually a less fraction of the length of the head or body in the older or larger individuals.

I give below the detailed measurements of several specimens to show the differences between the large and small in various proportions :—

—	No. 1. — Moderately large Male. Plate 85	No. 2. — Moderately large Female.	No. 3. —	No. 4. — Clouded, figured specimen. Plate 86.	No. 5. — Small specimen.	No. 6. — Very large specimen, 70 lbs. weight.
	ft.ins.lines.	ft.ins.lines.	ft.ins.lines.	ft.ins.lines.	ft.ins.lines.	ft.ins.lines.
Length from snout to distal end of middle of caudal	3 4 6	3 0 0	2 4 0	1 7 6	1 0 3	4 7 9
„ of caudal to middle	0 4 10	0 4 10	0 3 6	0 2 5	0 1 9	0 5 9
„ of snout to anterior edge of orbit	0 3 0	0 2 3	0 1 9	0 1 4	0 0 9	0 4 3
Distance between orbits	0 2 6	0 2 2½	0 2 0	0 1 5	0 0 7	0 4 0
Length of orbit	0 1 3	0 1 2	0 1 0	0 0 8½	0 0 6	0 1 6
„ of head from snout to end of operculum	0 11 4	0 9 9	0 7 7	0 5 6	0 3 0	1 3 9
„ from snout to anal (measured along ventral edge) ...	2 3 0	2 0 0	1 4 6	0 11 6	0 6 9	3 0 9
„ from front of anal to end of middle of caudal	1 4 0	1 2 6	1 0 6	0 9 3	0 5 6	1 11 6
„ from snout to base of pectoral	1 0 7	0 11 3	0 7 9	0 5 4	0 3 4	1 5 6
„ „ to origin of dorsal	1 6 0	1 1 6	0 9 7	0 6 9	0 4 3	1 9 0
„ „ to first branched ray of dorsal ...	2 1 0	1 9 6	1 3 6	0 10 11	0 6 9	2 9 0
„ „ to origin of ventral fin	0 9 9	0 9 6	0 7 9	0 5 3	0 3 0	1 5 0
Height of 1st ray of dorsal... ...	0 0 9	0 0 9	—	0 0 7	0 0 5	0 1 3
„ 2nd „	0 1 4	0 1 4	0 0 10	0 0 11	0 0 8	0 1 7
„ 5th spine of dorsal ...	0 1 9	0 2 0	0 1 6	0 1 5	0 1 0	—
Greatest height of soft rays of dorsal	0 4 0	0 4 0	0 3 0	0 2 1	0 1 5	0 4 9
Length of pectoral	0 4 4	0 4 0	0 3 4	0 2 0	0 1 6	0 5 2
„ longest ray of ventral ...	0 3 10	0 3 10	0 3 6	0 2 3	0 1 5	0 5 6
„ 2nd „ „ ...	0 3 9	0 3 6	0 2 10	0 1 9	0 1 2	0 4 9
Depth of anal	0 3 6	0 3 6	0 3 0	0 2 0	0 1 6	0 4 9
Length of anal	0 4 6	0 3 10	0 3 10	0 3 0	0 1 9	0 6 8
Depth of body in front of dorsal ...	0 11 6	0 9 6	0 7 3	0 4 3	0 2 9	1 1 0
Thickness of body in front of dorsal...	0 8 0	0 6 0	0 5 0	0 3 0	0 1 10	0 9 0
	No.	No.	No.	No.	No.	No.
Scales in 1 inch at middle of body ...	6	7	6½	10	15	4
„ along lateral line	122	117	115	127	109	186
„ above lateral line under front of dorsal	30	32	27	30	28	28
„ below lateral line under front of dorsal	51	38	45	30	53	70

Very abundant in the Murray and all the rivers flowing into it, but not found naturally in any of the rivers of Victoria flowing south. The Acclimatisation Society many years ago introduced it for the first time into the Yarra, where it is now established, but does not thrive, although its voracity has sensibly diminished the numbers of several of the native fishes of that river,

particularly the Blackfish (*Gadopsis gracilis*) and the Yarra Herring or Australian Grayling (*Prototroctes maræna*), which have now disappeared from the lower parts of the Yarra altogether.

EXPLANATION OF FIGURES.

PLATE 85.—Fig. 1, moderately large specimen (3 feet 4½ inches long) (the first branched ray of ventral not long enough); to show form and small spots of old fish. Fig. 1*a*, snout, viewed from above. Fig. 1*d*, inner view of mouth, showing bands of villiform teeth on lower jaw, and smooth tongue. Fig. 1*e*, inner view of upper jaw, showing crowded small villiform teeth on jaw, vomer, and palatine bones. Fig. 1*f*, one of the teeth, natural size. Fig. 1*g*, one of the teeth magnified. Figs. 1*h*, 1*i*, 1*k*, 1*l*, scales, natural size and magnified.

PLATE 86.—Fig. 1, small specimen, ⅔ the natural size (1 foot 7½ inches in length), showing the angular patches of large spots of the young. Fig. 1*a*, top view of head of same broad-snouted specimen. Fig. 2, outline of top of head of narrow-snouted specimen of about same size.

FREDERICK McCOY.

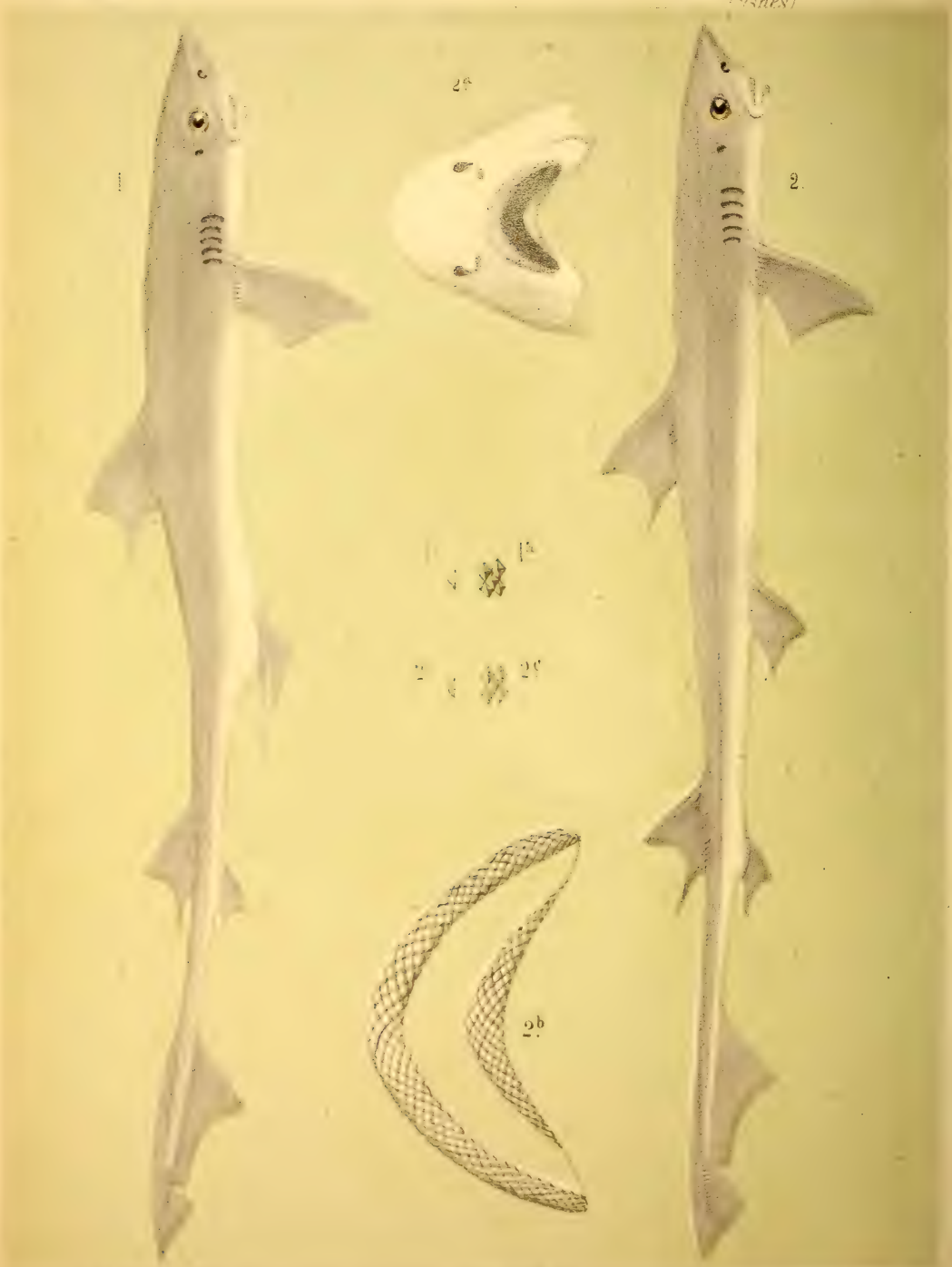

1
2a
2
1a
2c
2b

PLATE 87.

MUSTELUS ANTARCTICUS (GÜNTH.).

THE AUSTRALIAN SMOOTH-HOUND.

[Genus MUSTELUS (CUV.). (Sub-kingd. Vertebrata. Class Pisces. Order Plagiostomata. Sub-order Selachoidea. Fam. Carcharidæ. Sub-fam. Mustelinæ.)

Gen. Char.—Form tapering, moderately compressed. Five small gill-slits, the three anterior in front of pectoral. Two dorsals without spines, and moderate ventral and anal fins: caudal moderate, extremity of body scarcely elevated, a notch in distal lobe; basal lobes moderate. Nostrils with a very long narrow triangular lobe from anterior edge, and a small lobe from posterior margin. Mouth moderately arched, with strong prominent cartilages and a deep fold about each angle. Teeth very numerous, small, rhomboidal, flat, like a tiled pavement, of many alternate rows; the posterior rows in some species with a slight short median point, and one still smaller at one side. Spiracles moderate, a little behind and below the posterior corner of eye; eye elongate. A nictitating membrane. No pit in front of caudal. Scales very small, triangular, tricarinate. Cosmopolitan.]

DESCRIPTION.—Head semi-oval, flattened, pre-oral portion about equal to the width of mouth. Eyes approximate, lengthened with a thick fold below, forming the nictitating lid, their anterior edges about as far from tip of snout as from each other. Spiracle a little behind the eye. First dorsal small, entirely behind the inner posterior lobe of pectoral, or very slightly in front of it, a little nearer to snout than to the second dorsal; anterior and posterior bases of anal a little behind the corresponding parts of second dorsal; space between dorsals two and a half in length of the base of second dorsal. Tail very slightly elevated; notch in distal lobe of caudal fin deep and narrow. *Color:* Back and sides ashy-grey, with a slight pinkish-brown tinge on side of head and body; with, from nape to second dorsal, very small lighter spots on back and sides above lateral line; lower lip, lower third of sides, whole under surface of body, and under side of pectorals and ventrals, milk-white; hind edge of dorsals and tip of caudal blackish; iris mottled green and brown bronze, darker above and below. Teeth in about seven rows, the inner angle slightly prominent as a very obtuse cusp on the inner rows.

MEASUREMENTS.			SMALL FEMALE.		
	Ft.	ins.	lines.	Ft.	ins.	lines.
Total length to end of upper lobe of caudal	3	5	0	1	11	0
Length from snout to origin of 1st dorsal	1	1	0	0	7	1
„ of base of 1st dorsal	0	3	9	0	2	6
Height of 1st dorsal	0	4	0	0	2	9
Length of posterior lobe of 1st dorsal	0	1	7	0	1	1
„ from snout to anterior base of 2nd dorsal ...	2	3	0	1	2	0
„ of base of 2nd dorsal	0	3	0	0	2	0
Height of anterior part of 2nd dorsal	0	3	3	0	2	2
Length of posterior lobe of 2nd dorsal	0	1	2	0	0	10
„ from anterior origin of base of caudal fin to tip of upper lobe	0	6	4	0	4	6
„ from anterior base of 2nd dorsal to commencement of caudal	0	7	5	0	4	9
„ of anterior edge of lower lobe of caudal ...	0	2	10	0	2	0
„ from snout to anterior base of pectoral	0	8	9	0	4	9
„ of base of pectoral	0	2	0	0	1	5
„ of anterior margin of pectoral	0	5	0	0	3	2

Measurements—*continued.*	Ft. ins. lines.	Small Female. Ft. ins. lines.
Greatest width of pectoral	0 4 6 ...	0 2 10
Length of hind edge of pectoral to anterior edge of ventral	0 10 2 ...	0 5 6
„ of base of ventral	0 2 2 ...	0 1 3
„ of anterior margin of ventral	0 2 3 ...	0 1 5
„ from tip of snout to upper edge of nostril ...	0 1 9 ...	0 1 3
„ „ anterior edge of orbit ...	0 2 4 ...	0 1 11
„ „ spiracle	0 4 3 ...	0 2 10
„ of orbit	0 1 2 ...	0 0 7
„ of nostril	0 0 7 ...	0 0 6
Diameter of spiracle	0 0 3 ...	0 0 3
Width of mouth	0 2 1 ...	0 1 6
Length from tip of snout to middle of front edge of mouth	0 2 2 ...	0 1 7
„ of 1st gill-opening	0 1 1 ...	0 0 6
Girth behind pectoral	1 2 0 ...	0 7 9
Number of scales about middle of body in 1 line ...	Eight.	Ten.
Number of teeth in middle of jaw in 3 lines	Five.	Six.

Reference.—Günther, Cat. Fish. B. M. v. viii., p. 387.

This fish is a close representative of the European "Smooth-Hound" or Ray-mouthed Dog-fish, as the species of this genus are well called, from the blunt pavement of small, close, flat teeth, like those of a Skate or Ray, and I have continued the epithet "smooth," as, like the European species, the skin is softer and smoother than in other Sharks or Dog-fish. On comparison with the English *Mustelus vulgaris*, the Australian representative has a slightly smaller and more deeply notched 1st dorsal, which is also set much farther back than in *M. vulgaris*, its anterior margin in *M. Antarcticus* being clearly behind the inner posterior lobe of the pectoral in most specimens, but in a fresh female now before me it is slightly in front of it. A comparison of our figure with the similarly-sized Cornish one in "Couche's Fishes of British Islands," vol. 1, p. 47, will show these characteristic differences clearly; although the 1st dorsal is too large and not sufficiently notched, and there should be only one gill-opening behind the anterior edge of pectoral; the English fish, I find on comparison of specimens, agreeing in these respects with the Australian one. In other respects they are singularly alike, and agree altogether in food and habits.

This harmless little Dog-fish, feeding only on Zoophytes and Crustacea and small shell-fish, was among those for which the Victorian Government was induced to pay the fishermen, by measurement, for their destruction, some hundreds of pounds during

the years the vote appeared on the Estimates for the destruction of Sharks on our shores—this little blunt-toothed creature being accepted as the young of the gigantic White and Shovel-nosed Sharks, whose sharp teeth made havoc with fish, nets and men. There were no figures of our fishes to guide the well-intentioned blunderers at the time. It is much less prolific than the Picked Dog-fish, and the viviparous young have no placenta.

As usual in the genus, there is a small ridge from behind the head to the 2nd dorsal, and in this species continued thence to the caudal, and a smaller ridge from the anal to the caudal fin; there is no pit at base of caudal.

This fish is here figured of its natural colors for the first time.

Common in Hobson's Bay.

Explanation of Figures.

Plate 87.—Fig. 1, side view of male, one-sixth of natural size (the lower acute lobe of first dorsal scarcely elongate enough). Figs. 1*a* and 1*b*, teeth, twice natural size. Fig 2, side view of snout, one-seventh natural size. Fig. 2*a*, outline of under-side of head, one-third natural size, to show the form of snout, the valves of nostril, and the mouth. Fig. 2*b*, mouth and teeth, natural size. Figs. 1*c* and 1*d*, teeth, magnified two diameters.

Frederick McCoy.

A. Bartholomew del. et lith.

Prof. M.c Coy direx.r

Steam Litho. Govt. Printing Office

PLATE 88.

ALOPECIAS VULPES (LINN. SP.).

THE THRESHER, OR LONG-TAILED SHARK.

[Genus ALOPECIAS (MÜLL. AND HEN.). (Sub-kingd. Vertebrata. Class Pisces. Order Plagiostomata. Sub-order Selachoidea. Family Lamniidæ.)

Gen. Char.—First dorsal fin opposite to the space between the pectoral and ventral fins; the second dorsal and anal fins very small; the anal a little behind the second dorsal. Caudal fin of extraordinary length, with a pit at its base. No nictitating eyelid. Spiracles very minute, close behind the eye. Teeth nearly alike in both jaws, no middle tooth, the upper a little oblique, of moderate size, the third on each side in upper jaw much smaller than the adjoining ones, flat, triangular, with smooth edges. Gill-openings small or of moderate width, the two last very close together and over the base of the pectoral. Skin nearly smooth, with very minute scales, each with three slight keels.]

DESCRIPTION.—Body cylindrical until near tail, when it is strongly compressed laterally. Snout obtusely pointed, its length slightly less than the distance apart of the orbits. Mouth small. Nostrils very small. Pectorals very long, narrow, falcate, with a distinct posterior lobe at base. First dorsal high, triangular, with a projecting posterior lobe at base. Ventrals moderate, with a very long, narrow posterior lobe at base. Second dorsal very small, a little in front of the anal, which is similar in size and shape, each being oblong with a very long, slender prolongation of the posterior terminal angle. Pit above at base of caudal, with a prominent ridge in front of it. Upper lobe of caudal excessively long, much compressed, gradually tapering to a narrow, rounded distal extremity, bordered below by a narrow fin, widened into a small lobe near the point. Lower lobe of caudal triangular, of moderate size. Gill-openings very small, the two hinder gill-openings behind the anterior edge of the pectorals. *Color:* Above, dull bluish-grey, fading to whitish on the belly, with intermediate, irregular, grey, cloudy spots.

MEASUREMENTS.

	Ft.	ins.	lines.
Length from tip of snout to base of upper lobe of caudal ...	5	1	0
„ of upper lobe of caudal	5	1	0
„ of lower lobe of caudal	0	7	0
„ from tip of snout to anterior edge of orbit ...	0	3	5
Diameter of orbit	0	1	3
Length from posterior edge of orbit to spiracle	0	2	0
Diameter of spiracle	0	0	1½
Length from tip of snout to nostril	0	2	6
„ of nostril	0	0	6
„ from tip of snout to anterior edge of mouth ...	0	4	0
„ „ „ „ gill-opening ...	1	0	0
„ „ „ base of pectoral ...	1	4	9
„ „ „ „ 1st dorsal ...	2	5	0
„ „ „ „ 2nd dorsal ...	4	5	0
„ „ posterior edge of last gill-opening	1	6	6
„ „ anterior base of ventral ...	3	4	9
„ „ „ edge of anal fin ...	4	8	0
Height of 1st gill-opening	0	2	0
„ last gill-opening	0	2	6

Measurements—*continued.*	Ft.	ins.	lines.
Width of mouth	0	4	0
„ between middle of upper edge of orbits	0	4	0
Length from tip of snout to line connecting middle of upper edge of orbits	0	4	0
„ of base of pectoral	0	7	6
„ anterior edge of pectoral	1	5	0
„ base of 1st dorsal	0	7	6
„ anterior edge of 1st dorsal	0	10	3
„ base of 2nd dorsal	0	1	0
„ anterior edge of 2nd dorsal	0	1	0
„ posterior edge of 2nd dorsal	0	1	6
„ base of anal	0	1	0
„ anterior margin of anal	0	1	2
„ posterior „ „	0	1	9
Width of fin bordering the middle of upper caudal lobe, on lower edge	0	0	7
Width of lobe of same at point	0	0	3½
Depth in front of 1st dorsal	1	1	0
Length of upper tooth next middle from apex to middle of base	0	0	3
Width „ „ „ „	0	0	3
Length of lower tooth „ „ „	0	0	2½
Width „ „ „ „	0	0	2½

Reference.— = *Squalus vulpes* (Lin.), Syst. Nat. v. 1, p. 1496 = *Alopecias id.* (Müll. & Hen.) Plagiost., p. 74, t. 35, f. 1; Couch, F.B.I., v. 1, t. 7.

This most curious Shark differs from all others in the inordinate length of the upper lobe of the tail, which varies a little, but about equals the whole body in length, or is usually a little over half the total length.

The name "Thresher" arises from the strange habit this fish has of giving loud sounding blows to whales and other large bodies in the sea with its long slender tail as a thresher does with his flail. The Fox-Shark is a common name in England for this species. It is one of the rarest Sharks of our seas, only two examples having occurred to my knowledge on the Victorian coasts; of one of which a sketch was sent to me many years ago by a fisherman at Hastings, and the figured specimen from the same place is now in the Museum at Melbourne. It is perfectly identical in all respects with the European species, and thus is one of the few fishes having a perfectly world-wide distribution.

Explanation of Figures.

Plate 88.—Fig. 1, side view, reduced to 1-15th natural size. Fig. 1*a*, under view of head to show form of mouth and position of nostrils. Fig. 1*b*, nostril, natural size. Fig. 1*c*, form of section at hinder third of body. Fig. 1*d*, upper tooth, natural size. Fig. 1*e*, lower tooth, natural size.

Frederick McCoy.

(Polyzoa)

PLATE 89, FIG. 1.

CATENICELLA INTERMEDIA (P. McG.).

[Genus CATENICELLA (BLAINV.). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-ord. Cheilostomata. Fam. Catenicellidæ.)

Gen. Char.—"Cells arising one from the upper and back part of another by a short corneous tube, all facing the same way and forming dichotomously divided branches of an erect phytoid polyzoary; cell at each bifurcation geminate; each cell with two lateral processes, usually supporting an avicularium. Ovicells either subglobose and terminal, or galeriform and placed below the opening of a cell in front."]

DESCRIPTION.—Cells large, broad, rounded. Mouth lofty, narrow, arched above, lower lip slightly rounded upwards and forwards, and sometimes with a very minute sinus in the centre. Front with 5 large fenestræ. Lateral processes very wide, forming a wide cup above, and with a depression for a large avicularium on the outside. Back of cell smooth.

REFERENCE.—P. H. MacGillivray, Trans. Roy. Soc. Vict. 1868.

Port Phillip Heads.

It may be distinguished from *C. plagiostoma* by the nearly vertical mouth, the smaller fenestræ, and the absence of the peculiar enormous avicularia. The lateral process is usually absent or abortive on one side.

EXPLANATION OF FIGURES.

PLATE 89.—Fig. 1, fragment, natural size. Fig. 1*a*, front of cells, magnified. Fig. 1*b*, back of cells, magnified.

PLATE 89, FIG. 2.

CATENICELLA AMPHORA (BUSK).

DESCRIPTION.—Cells oval. Mouth arched above, nearly straight below. Front with a narrow, vertical, elliptical opening below the mouth, and a series of 9 pyriform fenestræ radiating to the circumference. Lateral processes of considerable size, occupying the upper angles, and produced into short points directed upwards, of nearly equal size; on one or both, below the point, is a small avicularian chamber. Back of cell smooth, with a broad, elevated, vertical band, giving off on each side a narrower band to the back of the avicularium.

REFERENCE.—Busk, Brit. Mus. Cat. Mar. Polyzoa, Pt. i. p. 8, pl. iv. f. 4, 5.

Port Phillip Heads, Mr. J. B. Wilson.

The beautiful vase-like shape of the cells and avicularian processes, with the anterior vertical slit and regular pyriform fenestræ, are sufficiently characteristic of this species.

EXPLANATION OF FIGURES.

PLATE 89.—Fig. 2, portion, natural size. Fig. 2*a*, front view of cells, magnified. Fig. 2*b*, back of cells, magnified.

PLATE 89, FIG. 3.

CATENICELLA WILSONI (P. McG.).

DESCRIPTION.—Cells large, squared at both ends. Mouth deeply arched above, the lower lip straight and entire. A space down the centre of the cell, of the same width as the mouth, occupied by a double row of (usually) 7 large, closely set, shallow fenestræ. The sides slope backwards from the margin of the fenestrate area, forming on each side a smooth, slightly hollowed space, nearly as wide as the central division, with an avicularian chamber at the upper angle. Back of cell with a prominent central band, extending the whole length, and, at about a third of the distance from the top, giving off a similar transverse band on each side. Ovicell large, rounded, terminal.

REFERENCE.—P. H. MacGillivray, Trans. Roy. Soc. Vict. 1880.

Port Phillip Heads, Mr. J. B. Wilson.

This handsome species cannot be confounded with any other. It is distinguished by the size of the cells and the regular space down the front occupied by the close-set double row of foramina. This is in reality the true front of the cell, the sloping spaces at the sides corresponding to the lateral processes of other species. At the upper angle there is a minute avicularian chamber. The ovicell is of great size, terminal, thickly covered with large, rounded fenestræ. The cell which it surmounts springs from one of a geminate pair; it differs from the others in being short, wide, without lateral extensions, and, instead of the regular fenestrate area, having a variable number of 3–5 large fenestræ; there is also usually a bulging on each side of the lower lip, seemingly supporting a horizontal avicularium.

EXPLANATION OF FIGURES.

PLATE 89.—Fig. 3, branch, natural size. Fig. 3*a*, portion, showing front of cells and ovicell, magnified. Fig. 3*b*, back of cells, magnified.

PLATE 89, FIG. 4.

CATENICELLA PULCHELLA (MAPLESTONE).

DESCRIPTION.—Cells elliptical, or, including the wide lateral processes, vase-shaped. Mouth arched above; lower lip nearly straight, with a deep rounded sinus. A close series of about 12 (5 or 6 on each side) rounded fenestræ arranged along the margin of the cell. The very wide lateral processes extending the whole length of the cell, divided into two portions by a partition extending outwards and downwards from the top of the cell; the upper part triangular, with the point directed upwards and outwards. In the outer edge, immediately below the partition, is a small avicularian cup. Back of cell minutely sulcate. Ovicell rounded, flat, situated on the front of a cell sessile on one of a geminate pair.

REFERENCE.—Maplestone, Journ. Mic. Soc. Vict.,' May 1880 = *C. concinna,* P. H. MacGillivray, Tr. Roy. Soc. Vict. 1880.

Queenscliff, Mr. Maplestone; Port Phillip Heads, Mr. J. B. Wilson.

The only specimens I have examined are mounted in balsam by the carbolic acid process, which has made them excessively transparent. Mr. Maplestone describes the cells as "with a row of small bosses or beads round the sides and lower portion of the cell," and the ovicell as "galeriform, ornamented with bosses and surmounted by two avicularia, geminate, not terminal." In my specimens the markings are certainly fenestræ, but in others they might be projections either from, in the young state, being covered by a bulging membrane, or being obscured by a calcareous overgrowth. In the description of the ovicell, Mr. Maplestone has evidently not distinguished between the ovicell itself and the cell to the lower part of which it is adherent.

EXPLANATION OF FIGURES.

PLATE 89.—Fig. 4, natural size. Fig. 4*a*, portion, magnified to show the front of the cells. Fig. 4*b*, back of cells, magnified. Fig. 4*c*, front of another portion, magnified, to show the ovicell.

PLATE 89, FIG. 5.

CATENICELLA UTRICULUS (P. McG.).

DESCRIPTION.—Cells contracted above and below. Mouth arched above, lower lip with a wide shallow sinus. Front smooth, or very finely papillose. A very narrow, entirely marginal vitta the whole length of the cell on each side. Lateral processes triangular, extending forwards and outwards from each side of the mouth, with a small avicularium on the outer edge, and frequently a small pyriform mark (probably avicularian) at the base in front. Back of cell very finely sulcate.

Warrnambool, Mr. H. Watts.

I have only seen two minute fragments of this species, which were sent in a slide to the Museum. The cells are ovate or pyriform, contracted above and below. The avicularian processes are triangular and ear-like, limited in extent to the depth of the mouth, from the sides of which they directly rise; the superior margins above the mouth are closely contiguous, although not quite continuous. On the edge of the lateral process is usually a small avicularium, and at the junction of the lower angle with the cell is frequently a triangular mark, which may possibly indicate another avicularium.

EXPLANATION OF FIGURES.

PLATE 89.—Fig. 5, natural size. Fig. 5*a*, front of cells, magnified; the very shallow sinus is not shown in the lower lip. Fig. 5*b*, back of cells, magnified.

The specimens and descriptions of the above *Catenicellæ* are contributed by Mr. MacGillivray.

FREDERICK McCOY.

ZOOLOGY OF VICTORIA

(Polyzoa)

J. Ripper del. et lith.

Prof. McCoy direxit

Steam litho. Govt. Printing Office.

PLATE 90, FIG. 1.

CATENICELLA FUSCA (P. McG.).

DESCRIPTION.—Cells elongated, narrow, bulging posteriorly. Mouth arched above, lower lip slightly hollowed. Surface smooth or slightly papillose. Vittæ entirely lateral, extending the whole length of the cell. Lateral processes small, stout, conical, directed forwards, with a minute avicularium at the base of the external margin. Ovicell cemented to the front of the cell above, which is sessile on the ovicelligerous cell, front flat or slightly hollowed, with a beaded margin.

Queenscliff.

Forms large, handsome, greyish-brown tufts, the large stalks chestnut-red. It is closely allied to *C. Buskii.*

EXPLANATION OF FIGURES.

PLATE 90.—Fig, 1, natural size. Fig. 1*a*, front of branch, magnified. Fig. 1*b*, back of small portion, magnified. Fig. 1*c*, profile view, to show the bulging of the back of the cells and the flat front of the ovicell.

PLATE 90, FIG. 2.

CATENICELLA UMBONATA (BUSK).

DESCRIPTION.—Cells small, wide above, narrowed below, bulging forwards. Mouth arched above, lower lip hollowed. Surface minutely papillose. Vittæ anterior, extending from the base of the cell to the lower lip. Lateral processes with an avicularium in a deep cup beneath the upper angle. Posterior surface smooth, with a prominent umbo in the middle. Ovicell cemented to the cell above, which is sessile on the ovicelligerous cell, with a broad vertical ridge and a raised smooth or beaded margin.

REFERENCE.—Busk, Brit. Mus. Cat. Mar. Polyzoa, Pt. i., p. 11, pl. x., f. 4, 5.

Port Phillip Heads.

Forms small glassy tufts on other zoophytes.

EXPLANATION OF FIGURES.

PLATE 90.—Fig. 2, natural size. Fig. 2*a*, portion of branch to show the front, magnified. Fig. 2*b*, back of geminate and ordinary cell, magnified. Fig. 2*c*, cell in profile, to show the projection of posterior umbo.

PLATE 90, FIG. 3.

CATENICELLA CORNUTA (BUSK).

DESCRIPTION.—Cells elongated, papillose in front. Vittæ lateral, extending the whole length of the cell. One or both lateral processes long, pointed and recurved, frequently with a small aperture at the base. Ovicell galeate, surmounting one of the cells of a geminate pair, terminal, with a sharp spine on the summit.

REFERENCE.—Busk, Voy. Rattl., i. 361; Cat. Mar. Pol. Brit. Mus., pt. i. p. 11, pl. 10, f. 1, 2, 3.

Queenscliff.

Forms small greyish tufts, 1 to 2 inches high. The only species with which it is likely to be confounded is *C. perforata*, from which it may be distinguished by the retrocedent, spinous, lateral processes, and by the spine on the summit of the ovicell. The long spine is frequently absent on one or both sides, and in its place is a lateral process with a wide, gaping hollow, in which is lodged an avicularium.

EXPLANATION OF FIGURES.

PLATE 90.—Fig. 3, natural size. Fig. 3*a*, front, magnified. Fig. 3*b*, another branch, showing an ovicell with its superior spine. Fig. 3*c*, back of cells, magnified.

The typical specimens and descriptions of the above *Catenicellæ* are from Mr. MacGillivray.

FREDERICK McCOY.

By Authority: JOHN FERRES, Government Printer, Melbourne.

CONTENTS OF DECADES.

N.B.—The originals of all the Figures are in the National Museum, Melbourne.

DECADE I.

PLATE 1.—The Black Snake (Pseudechys porphyriacus, Shaw sp.).
PLATE 2.—The Copper-head Snake (Hoplocephalus superbus, Günth.).
PLATE 3.—The Tiger Snake (Hoplocephalus curtus, Schl. sp.).
PLATE 4.—The Australian Bream (Chrysophrys Australis, Günth.).
PLATE 5.—The Spiny-sided Butterfly-Gurnard (Lepidotrigla Vanessa, Rich. sp.).
PLATE 6.—The Kumu Gurnard (Trigla Kumu, Lesson and Garn.).
PLATE 7.—The Australian Giant Earth-worm (Megascolides Australis, McCoy).
PLATE 8.—Lewin's Day-moth (Agarista Lewini, Boisd.).
The Loranthus Day-moth (Agarista Casuarinæ, Scott).
The Vine Day-moth (Agarista Glycine, Lewin sp.).
PLATE 9.—Pieris (Thyca) Harpalyce (Don. sp.).
PLATE 10.—Pieris (Thyca) Aganippe (Don. sp.).

DECADE II.

PLATE 11.—The Little Whip Snake (Hoplocephalus flagellum, McCoy). The White-lipped Snake (Hoplocephalus coronoides, Günth.).
PLATE 12.—The Death Adder (Acanthophis Antarctica, Shaw sp.).
PLATE 13.—The Carpet Snake (Morelia variegata, Gray).
PLATE 14.—The Gippsland Perch (Lates colonorum, Günth.).
PLATE 15.—The Murray Lobster (Astacoides serratus, Shaw sp.).
PLATE 16.—The Salmon Arripis (Arripis truttaceus, Cuv. sp.). Adult.
PLATE 17.—Ditto of the younger forms and coloring.
PLATE 18.—The Horse Mackerel (Trachurus trachurus, Lin. sp.).
PLATE 19.—The Small-scaled Rock Cod (Lotella callarias, Günth.).
PLATE 20.—The Australian Rock Cod (Pseudophysis barbatus, Günth.).

DECADE III.

PLATE 21.—The Sea-Leopard Seal (Stenorhynchus leptonyx, de Blainv. sp.).
PLATE 22.—The Yellow-sided Dolphin (Delphinus Novæ Zealandiæ, Quoy and Gaim.).
PLATE 23.—The Common Brown Snake (Diemenia superciliosa, Fisch.).
The Small-scaled Brown Snake (Diemenia microlepidota, McCoy).
The Shield-fronted Brown Snake (Diemenia aspidorhyncha, McCoy).
PLATE 24.—Catenicella margaritacea (Busk).—C. plagiostoma (Busk).—C. ventricosa (Busk).—C. hastata (Busk.)—C. rufa (McG.).—C. cribraria (Busk).—C. alata (Wyv. Thomson).—C. lorica (Busk).—C. formosa (Busk).—C. elegans (Busk).—C. perforata (Busk).—C. Buskii (Wyv. Thomson).—C. Hannafordi (McG.).—C. crystallina (Wyv. Thomson).—C. carinata (Busk).—C. aurita (Busk).—C. geminata (Wyv. Thomson).—C. cornuta (Busk).—C. intermedia (McG.)
PLATE 25.—Membranipora membranacea (Linn. sp.).—M. perforata (McG.).—M. ciliata (McG.).—M. mamillaris (McG.).—M. umbonata (Busk).—M. pilosa (Linn. sp.).—M. cervicornis (Busk).
PLATE 26.—Membranipora dispar (McG.).—M. Woodsii (McG.).—M. lineata (Linn. sp.).—M. Rosselii (Audouin sp.).—M. Lacroixii (Savigny sp.).
PLATE 27.—The Australian Rockling (Genypterus Australis, Cast.).
The Yarra Blackfish (Gadopsis gracilis, McCoy).
PLATE 28.—The Southern Mackerel (Scomber pneumatophorus, De la Roche).
PLATE 29.—The Yabber Crayfish (Astacoides bicarinatus, Gray sp.).
PLATE 30.—The Large Wattle Goat-Moth (Zeuzera Eucalypti, Boisd. Herr.-Schæf.).

DECADE IV.

PLATE 31.—The Australian Sea-Bear or Fur-Seal (Euotaria cinerea, Péron sp.).
PLATE 32.—The Two-hooded Furina-Snake, Furina bicucullata (McCoy).
PLATE 33.—The Banded Red Gurnet-Perch (Sebastes percoides, Solander sp.).
PLATE 34.—The Angel-fish (Rhina squatina, Lin. sp.).
PLATE 35.—Lepralia circinata (McG.).—L. Cecilii (Aud.).—L. diaphana (McG.).—L. marsupium (McG.).—L. subimmersa (McG.).—L. anceps (McG.).—L. Maplestonei (McG.).
PLATE 36.—Lepralia vittata (McG.).—Membranipora perforata. Lepralia Brogniartii (Aud.).—L. elegans (McG.).—L. pertusa (Esper. sp.).—L. Malusii (Aud. sp.).—L. lunata (McG.).
PLATE 37.—Lepralia ciliata (Linn. sp.).—L. trifolium (McG.).—L. cheilodon (McG.).—L. canaliculata (McG.).—L. larvalis (McG.).—L. diadema (McG.).—L. papillifera (McG.).—L. Ellerii (McG.).
PLATE 38.—Lepralia monoceros (Busk).—L. excavata (McG.).—L. vitrea (McG.).—L. megasoma (McG.).—L. Schizostoma (McG.).—L. Botryoides (McG.).—L. ferox (McG.).—L. pellucida (McG.).
PLATE 39.—Crisia Edwardsiana (D'Orb. sp.).—C. biciliata (McG.).—C. acropora (Busk).—C. setosa (McG.).—C. tenuis (McG.).
PLATE 40.—Saunders' Case-Moth (Metura elongata, Saunders sp.).
The Lictor Case-Moth (Entometa ignobilis, Walk.).

DECADE V.

PLATE 41.—The Lace Lizard (Hydrosaurus varius, Shaw sp.).
PLATE 42.—The Spotted Marsh-Frog (Limnodynastes Tasmaniensis, Günth.).—The Common Sand-Frog (Limnodynastes dorsalis, Gray).
PLATE 43.—The Carpet Shark (Crossorhinus barbatus, Lin. sp.).—The Seven-gilled Shark (Notidanus [Heptanchus] Indicus, Cuv.).
PLATE 44.—The Barracouta (Thersites atun, Cuv.).—The Tunny (Thynnus Thynnus, Lin. sp.).
PLATE 45.—Flustra denticulata (Busk).—Carbasea episcopalis (Busk).—C. dissimilis (Busk).—C. indivisa (Busk).—C. elegans (Busk).—C. pisciformis (Busk).
PLATE 46.—Spiralaria florea (Busk).—Diachoris Magellanica (Busk).—D. spinigera (P. McGil.).—Dimetopia spicata (Busk).—D. cornuta (Busk).—Didymia simplex (Busk).—Calwellia bicornis (Wyv. Thomson).
PLATE 47.—Dictyopora cellulosa (P. McGil.).
PLATE 48.—Eschara obliqua (P. McGil.).—E. dispar (P. McGil).—E. gracilis (Lamx.).—E. platalea (Busk).—E. quadrata (P. McGil.)—E. mucronata (P. McGil.).—Caleschara denticulata (P. McGil.).
PLATE 49.—Cellaria fistulosa (Linn.).—C. hirsuta (P. McGil.).—C. tenuirostris (Busk.).—C. gracilis (Busk).—Nellia oculata (Busk).—Tubucellaria hirsuta (Busk).
PLATE 50.—The Great Black, or Manna Cicada (Cicada mœrens, Germ.).—The Great Green Cicada (Cyclochila Australasiæ, Donov. sp.).

DECADE VI.

PLATE 51.—The Victorian Rhodona (Rhodona Officeri, McCoy).
PLATE 52.—The Black and White Ringed Snake (Vermicella annulata, Gray).
PLATE 53.—The Green and Golden Bell-Frog (Ranoidea aurea, Less. sp.).
PLATES 54–55.—The Australian Aulopus (Aulopus purpurisatus, Rich.).
PLATE 56.—The Hammer-headed Shark (Zygæna malleus, Shaw).—The Common Australian Saw-Fish (Pristiophorus nudipinnis, Günth.).
PLATE 57.—Biflustra perfragilis (McGil.).—B. delicatula (Busk).
PLATE 58.—Cellularia cuspidata (Busk).—Menipea crystallina (Gray sp.).—M. cyathus (Wyv. Thomson).—M. cervicornis (McGil.)—M. tricellata (Busk).—M. Buskii (Wyv. Thomson).
PLATE 59.—Bicellaria tuba (Busk).—B. grandis (Busk).—B. ciliata (Linn).—B. turbinata (McGil.).—Stirparia annulata (Map.).—Bugula neritina (Linn.).
PLATE 60.—Steganoporella magnilabris (Busk. sp.).—Petralia undata (McGil.).

DECADE VII.

PLATE 61.—The Tuberculated Argonaut (Argonauta oryzata, Meusch.).
PLATE 62.—The same seated in its so-called shell or Paper-Nautilus.
PLATE 63.—The Blue-spotted Eagle-Ray (Myliobatis Australis, Macleay).
PLATE 64.—The Long-toothed Bull-Shark (Odontaspis taurus, Raf.).—The Australian Tope Shark (Galeus Australis, Macleay).
PLATE 65 —The Leafy Sea-Dragon (Phyllopteryx foliatus, Shaw sp.).—The Short-headed Sea-horse (Hippocampus breviceps, Pet.)
PLATE 66.—Dictyopora grisea (Lamx. sp.).—D. albida (Kirch.)—(Var. avicularis, P. McGill.).
PLATE 67.—D. Wilsoni (P. McGill.).
PLATE 68.—Idmonea Milneana (d'Orb.).—I. contorta (P. McGill.).—I. radians (Lamk.).
PLATES 69–70.—The Violet-shouldered Phasma (Tropidoderus iodomus, McCoy).—The Red-shouldered Phasma (Tropidoderus rhodomus, McCoy).

DECADE VIII.

PLATE 71.—The Australian Sea-Bear or Fur-Seal (Euotaria cinerea, Péron sp.).
PLATE 72.—The Northern Blue-tongued Lizard (Cyclodus gigas, Bodd. sp.).
PLATE 73.—The Ludrick (Girella simplex, Rich. sp.).
PLATE 74.—The White Shark (Carcharodon Rondeletii, Müll. and Hen.).
PLATE 75.—The Picked Dog-Fish (Acanthias vulgaris, Linn. sp.).
PLATES 76–77.—The Australian Tooth-cupped Cuttlefish (Sepioteuthis Australis, Quoy and Gaim.).
PLATE 78.—Bugula robusta (P. McGil.).—B. cucullata (Busk).—B. dentata (Lamx.).—B. avicularia (Pall.).
PLATE 79.—The Violet-winged Phasma (Acrophylla violascens, Leach sp.).
PLATE 80.—The Large Pink-winged Phasma (Podacanthus typhon, Gray).

Natural History of Victoria.

PRODROMUS

OF THE

ZOOLOGY OF VICTORIA;

OR,

FIGURES AND DESCRIPTIONS OF THE LIVING SPECIES OF ALL CLASSES

OF THE

VICTORIAN INDIGENOUS ANIMALS.

DECADE X.

BY

FREDERICK McCOY, F.R.S.,

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M DCCC LXXXV.

PREFACE.

—o—

It having been considered desirable to ascertain accurately the natural productions of the Colony of Victoria, and to publish works descriptive of them, on the plan of those issued by the Governments of the different States of America, investigations were undertaken, by order of the Victorian Government, to determine the Geology, Botany, and Zoology of the Colony, to form collections illustrative of each for the public use, and to make the necessary preparations for such systematic publications on the subject as might be useful and interesting to the general public, and contribute to the advancement of science.

As the geological and botanical investigations have already approached completion, and their publication is far advanced, it has been decided now to commence the publication of the third branch completing the subject, namely, that of the Zoology or indigenous members of the different classes of the animal kingdom.

As the Fauna is not so well known as the Flora, it was a necessary preliminary to the publication to have a large number of drawings made, as opportunity arose, from the living or fresh examples of many species of reptiles, fish, and the lower animals, which lose their natural appearance shortly after death, and the true characters of many of which were consequently as yet unknown, as they had

only been described from preserved specimens. A Prodromus, or preliminary issue, in the form of Decades, or numbers of ten plates, each with its complete descriptive letterpress, will be published, of such illustrations as are ready, without systematic order or waiting for the completion of any one branch. The many good observers in the country will thus have the means of accurately identifying various natural objects, their observations on which, if recorded and sent to the National Museum, where the originals of all the figures and descriptions are preserved, will be duly acknowledged, and will materially help in the preparation of the final systematic volume to be published for each class when it approaches completion.

In the first plate (91) of this tenth Decade there is the first coloured representation of that most curious and rare Marsupial, the *Gymnobelideus Leadbeateri;* which, with the form, feet, and dentition of the beautiful Marsupial so-called Flying Squirrels of Australia, constituting the genus *Belideus*, is entirely destitute of the lateral expansion of skin forming the parachute which enables the *Belidei*, like the true Flying Squirrels of other countries, to almost fly, in their sustained jumps from one tree to another.

The second and third plates show the natural colours for the first time of a River Tortoise, the *Chelodina longicollis*, which abounds in many of the rivers of Gippsland, and more rarely in the Murray, where the *Chelymys Macquaria* (figured in our plates 82 and 83) is the common Tortoise—a species not known in the rivers flowing south into the sea.

The six following plates illustrate a splendid series of Victorian species of *Retepora*, contributed by Dr. MacGillivray to the National Museum and this work.

The last plate gives full details of the fine Sea-Urchin, the *Goniocidaris tubaria*, with its extraordinary variety of spines ; all

different, however, from the fossil spines of the same genus found in the Tertiary formations of our shores.

The succeeding Decades will illustrate as many different genera as possible, and will deal first usually with species of some special interest, and of which good figures do not exist, or are not easily accessible.

FREDERICK MCCOY.

16th September, 1883.

ZOOLOGY OF VICTORIA

(Mammals)

Dr Wild del et lith

Prof. McCoy direxit

Steam litho, Govt. Printing Office

PLATE 91.

GYMNOBELIDEUS LEADBEATERI (McCOY).

[Genus GYMNOBELIDEUS (McCoy). (Sub-kingd. Vertebrata. Class Mammalia. Order Marsupialia. Fam. Phalangistidæ.)

Gen. Char.—Teeth and general form of *Belideus*, but destitute of the lateral, cloak-like parachute or flank-membrane, and having on the fore feet the inner finger or thumb shortest, the second longer, the third longer than the second, the fourth longest, the fifth (or outer) toe shorter than the third, but longer than the second. On the hind feet the inner toe or thumb is succeeded by two of nearly equal size, more slender and shorter than the others, and united together as far as the base of the last joint. The thumbs of the hind feet are without nails, and the claws of all the other toes are small, and exceeded in length by the prominent wrinkled pads on the underside. The ears are large, semielliptical, and nearly naked towards the tips. Dental formula :—incisors $\frac{3}{1}$, canines $\frac{1}{0}$, premolars $\frac{3}{3}$, molars $\frac{4}{4} = 40$. Australia.]

DESCRIPTION.—Upper surface brownish grey, with a blackish, dusky streak from the top of the head along the back to the sacrum; there is a dark patch under the base of the ear, and a fainter one before and behind the eye. Under surface dull yellowish; tail rather lighter than the back, and lightish at the tip. Head like that of *Belideus breviceps*, but with a slightly sharper snout. The tail has the fur no longer on the basal half than on the back, the apical third of the length being gradually more bushy, from the greater length of the hair. Ears brown. The fur of the body is soft and dense, the hairs grey at the base, and blackish and tipped with brownish white at the end; the fur of the tail is brownish throughout. *Teeth :* Anterior incisor above more than twice the length of the others, and rather broader near the edge than at the base; second incisor shorter than the third, which is triangular; space between third incisor and canine equal to length of second incisor; canine conical, shorter than the first, but longer than the third incisor; space between canine and next premolar one-third the width of the canine; second premolar half the length of the canine, first a little longer, both triangular and single-rooted; third premolar as long as the canine, or one-third longer than the next molar, double-rooted, and triangular. First three molars quadrate, with two blunt tubercles on outer and two on inner edge; fourth or last molar smallest, triangular, with one tubercle behind and two in front. The molars and second and third premolars are in continuous contact. *Lower jaw :* All the teeth in continuous series without interval; incisors long, nearly horizontal, sharp-pointed; first three premolars small, short, and obtuse, the antero-posterior extent of the first greatest; third least, but all of one height; fourth premolar twice the height of the others, triangular, with a slight lobe at back of base; first molar with anterior half forming a conical lobe nearly twice the height of the last premolar and of the

rest of the molars; posterior half bitubercular, and only as high as the others, which are all quadritubercular, except the small hind one, which is tritubercular.

	Ins.	lines.
Length of head	1	8
„ from snout to base of tail	5	4
„ of tail	6	5
„ of ear	0	9
„ of fore foot	0	9
„ of hind foot	1	$0\frac{1}{2}$
„ of nasal bones	0	$6\frac{1}{2}$
„ of frontal bones	0	7

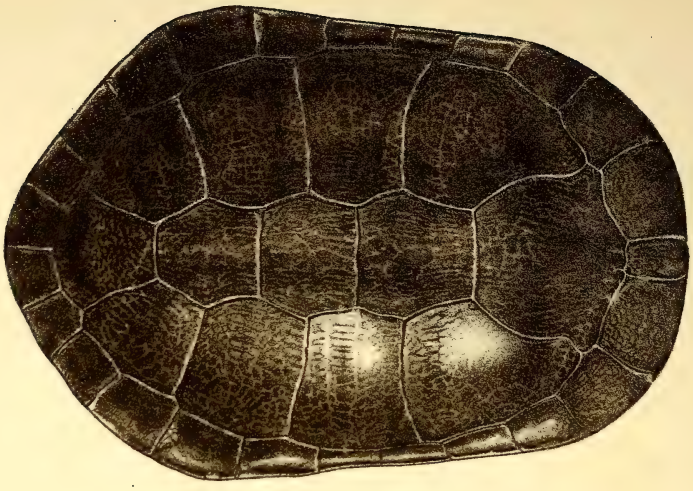
REFERENCE.—McCoy, Ann. and Mag. Nat. Hist. 1867, vol. xx. p. 287.

In general appearance this curious animal is intermediate between *Belideus* and *Phascogale;* but its nearest affinity is with the former, from which the absence of the flank-membrane and the different form of the feet distinguish it. There is only one species known, which occurs in the scrub on the banks of the Bass River, in Victoria. I name it after the skilled taxidermist of our Public Museum, in which specimens of both sexes are preserved.

EXPLANATION OF FIGURES.

PLATE 91.—Fig. 1 represents the male, two-thirds the natural size. Figs. 1*a*, fore foot, and 1*b*, hind foot, twice the natural size. Fig. 1*c*, skull, side view, natural size. Fig. 1*d*, same, viewed from above. Fig. 1*e*, teeth of upper jaw, magnified two diameters. Fig. 1*f*, teeth of lower jaw, twice natural size.

FREDERICK McCOY.



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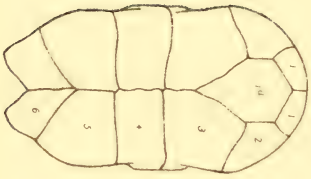

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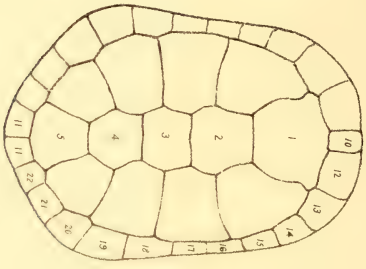

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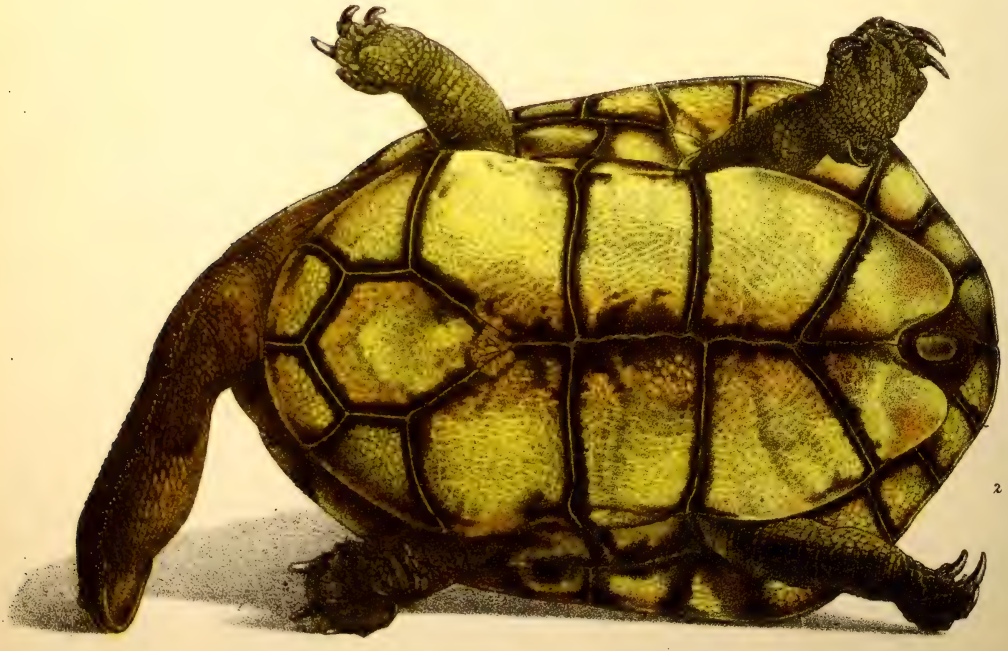

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PLATES 92 AND 93.

CHELODINA LONGICOLLIS (SHAW SP.).

LONG-NECKED RIVER TORTOISE.

[Genus CHELODINA (GRAY). (Sub-kingdom Vertebrata. Class Reptilia. Section Cataphracta. Order Chelonia. Sub-order Pleuroderes. Family Chelydidæ. Sub-family Hydraspidinæ.)

Gen. Char.—Head long, flat; covered with thin skin; muzzle short; mouth wide; jaws narrow, weak, without notches; no barbels under chin. Neck very long. Plastron wide, rounded in front, solidly fixed to the carapace; sternal wings very short; 25 marginal plates to the carapace, and 13 to the plastron; a nuchal plate; intergular plate larger than the gulars. Four toes of the five claws on each foot. Tail very short. Australia.]

DESCRIPTION.—*Form:* Carapace oblong, ovate, slightly narrowed in front, obtusely angulate behind; a variable convexity with a deep wide channel along the 2nd, 3rd, and 4th vertebral plates, more marked in old specimens; nuchal plate between the margino-collar (12); the plates of the margin are less than half the width at the sides, as over the neck, limbs, and tail, and are abruptly reflected or curled upwards, so that the outer edge is nearly in contact with the inner margin; moderately arched over the thighs, and angularly elevated at inner margin of caudals; profile of back gently arched, deepest behind the middle, falling suddenly to the posterior end, more gradually towards the front. *Plates:** Nuchal plate (10) large, quadrilateral, varying from one-third longer than wide to twice as long as wide, between the margino-collars (12), which are trapezoidal; margino-brachials quadrangular, a little longer than wide, the first pair (13) with the anterior margin wider than the posterior; second pair (14) with anterior margin wider than posterior; first margino-laterals (15) smaller than the posterior margino-brachial; second margino-lateral (16) rectangular; 3rd (17) and 4th (18) rhomboidal; 5th (19) oblong, wider behind than before; margino-femorals (20, 21, 22) quadrate; supra-caudals (11) trapezoidal. First vertebral plate (1) octagonal, larger than the others, touching the nuchal, the margino-collar, and the first margino-brachial, posterior side concave; 2nd (2) and 3rd (3) hexagonal; 4th (4) hexagonal, anterior side wider than the posterior. The 5th vertebral plate (5) is an isoceles triangle with truncated apex, with five angles at base behind; the last costal plates (9) have nearly the same shape as the 5th vertebral, but are larger. All the plates of carapace with a few concentric lines at margin, and obtuse, irregular, nodular ridges and tubercles longitudinal on the vertebral plates, and transverse on the costal plates; plates of plastron nearly smooth, finely netted in the middle. Plastron very wide, the width varying from wider in front than behind to narrower in front than behind, some equal; rounded in front, and with a V-shaped notch behind, the angles of which are obtusely rounded; the sternal wings are about one-fourth as wide as the plastron, and about one-third its length, bent up strongly towards the carapace; intergular plate (1*a*) very large, hexagonal, the two posterior sides longest and forming an acute angle posteriorly, surrounded by the three first pairs of sternal plates (1, 2, 3); gular plates (1) four-sided, wider than long, inner side shorter than outer margin; humerals (2) trapezoidal, larger than the gulars, but half the size of the pectorals (3); pectorals pentagonal, two right angles behind, one in

* The numbers designating the individual plates will be found on a diagram in our plate of *Chelemys Macquaria*, Plate 83.

front; abdominal plates (4) rectangular, transversely oblong; femorals (5), trapezoidal or subtriangular with curved base and truncated apex; anals (6) rhomboidal, with two short and two longer sides. Head long, much flattened behind, obtusely pointed, rounded in front, jaws feeble with simple edges; skin of front and a large, rhomboidal space between the eyes smooth; temples and rest of head covered with small, polygonal or oval, juxtaposed scales. Neck slender, slightly depressed, covered above with convex, oval, flattened tubercles, and below with fine, longitudinal ridges on the throat, rarely tuberculated on the more posterior part of the underside; four or five scale-like, transverse, chevron-shaped folds on the front of the arm, four or five larger, triangular plates on outer side of arm, and several similar ones cross the toes; two rows (one of six, the other of three) of transverse, scale-like folds on hinder part of tarsus; webs wide to base of claws with notched edges; claws long, compressed, moderately curved; tail and posterior part of body covered with triangular, more or less flattened tubercles; tail very short, compressed, scarcely exceeding end of carapace. *Colour:* Carapace very dark brown, or blackish; sternum and lower surface of marginal plates rich yellow ochre, with dark brown borders to the sutures, varying in width, sometimes narrow, but sometimes so wide as almost to obliterate the yellow on the sternal and lower side of marginal plates; throat and underside of neck, arms, and thighs whitish; head and upper surface of limbs and rest of body blackish grey; lower jaw bright yellow; iris yellowish white.

MEASUREMENTS.

	Female, from junction of Murray and Darling.	Specimen from 12 miles from Maffra, Upper Gippsland.	Female with large ovary, June 1883.	Male, from Gippsland, June 1883.	Young male, from Gippsland, 11th June 1883.
	Ins. lines.	Ins. lines.	Ins. lines.	Ins. lines.	Ins. lines.
Length of carapace	8 6	9 0	7 0	7 3	5 6
Greatest width at last margino-lateral plate (19)	6 5	6 3	4 10	4 10	4 1
Depth from middle of sternum to middle of carapace	2 9	2 10	2 3	2 3	1 11
Length of nuchal plate (10)	1 0	0 11	0 8	0 8	0 7
Width in front	0 7	0 5½	0 5	0 5	0 5½
Outer margin of—					
1st marginal plate—anterior or margino-collar plate (12) ...	1 4½	1 3½	1 1	1 1	0 8
2nd „ „ margino-brachial (13)	1 1	1 1	0 11	0 11	0 9
3rd „ „ margino-brachial (14)	0 9	0 10	0 8	0 9	0 8
4th „ „ margino-lateral (15)	0 10	1 1	0 9	0 10	0 8
5th „ „ margino-lateral (16)	0 11½	1 0	0 8½	0 9	0 5
6th „ „ margino-lateral (17)	0 10½	0 11½	0 8	0 8	0 6
7th „ „ margino-lateral (18)	1 1	1 2	0 7	0 10	0 8
8th „ „ margino-lateral (19)	1 2	1 1	1 0	0 10½	0 8
9th „ „ margino-femoral (20)	1 0	0 11	0 9	0 10	0 8
10th „ „ margino-femoral (21)	0 11	0 11	0 9	0 9	0 8
11th „ „ margino-femoral (22)	0 8	0 8	0 8	0 8	0 6
Outer margin of each caudal plate (11) ...	0 9	0 11	0 9	0 10	0 6½
Length of 1st vertebral plate (1)	1 8	2 0	1 8	1 8	1 2
Greatest width at front	2 4	2 7	2 1	2 0	1 6
Width behind	0 11	1 1	0 11	0 11	0 10
Length of 2nd vertebral plate (2)	1 5	1 6	1 1	1 2	0 11
Greatest width a little behind middle ...	1 4	1 7	1 5	1 4	1 0
Length of 3rd vertebral plate (3)	1 3	1 4	0 10½	1 1½	0 10
Greatest width at middle	1 3	1 3	1 1	1 2	0 11
Length of 4th vertebral plate (4)	1 3	1 3	1 3 *	1 1	0 7
Greatest width about middle	1 1	1 2	0 11	0 10	0 9

* Divided into two.

MEASUREMENTS—*continued.*

	Female, from junction of Murray and Darling.	Specimen from 12 miles from Maffra, Upper Gippsland.	Female with large ovary, June 1883.	Male, from Gippsland, June 1883.	Young male, from Gippsland, 11th June 1883.
	Ins. lines.	Ins. lines.	Ins. lines.	Ins. lines.	Ins. lines.
Length of 5th vertebral plate (5)	1 7	1 9	1 3	1 5	1 3
Greatest width behind	1 11	1 8	1 7	1 7	1 2
Width at front margin	0 6	0 8	0 6	0 5	0 6
Length of neck from front edge of carapace to occiput	3 5	3 6	3 5	3 7	2 4
Diameter at middle	0 11	1 0	1 0	0 11	0 10
Length of head	1 6	1 9	1 6	1 5	1 4
Greatest width at hind margin of ear ...	1 1	1 3	1 1	1 0	0 10½
Greatest width	0 7	0 9	0 9	0 8	0 8½
Diameter of ear	0 4½	0 5	0 4	0 3½	0 3
Length of anterior limb, about	2 7	3 0	2 6	2 4	2 0
„ „ longest toe, without claw	0 6	0 5	0 4	0 5	0 5
„ „ claw	0 5	0 6	0 3	0 3	0 3
„ „ posterior limb, about	3 6	3 8	3 0	2 8	2 0
„ „ longest toe, without claw	0 9	0 6	0 5	0 5	0 4
„ „ claw	0 5½	0 7	0 5	0 3½	0 4
„ „ tail, about	0 9	0 6	0 6	0 8	0 7
„ „ intergular plate	2 2	2 2	2 0	1 11	1 7½
Greatest width	1 8	2 0	1 7	1 5	1 0½
Width of gular plates (1) at outer margin, each	1 2	1 2	1 0	0 11	0 9
Outer margin of humeral plate (2)	1 10	2 1	1 4	1 7	1 2½
Length of anal plates (6) at outer margin ...	1 3	1 3	1 0	0 10	0 9
Width of plastron across ends of caudal plates	2 11	1 6	1 2	1 1	1 0
„ across middle of femoral plates (5) ...	4 2	4 5	3 5	3 2	2 9
„ of plastron across ends of posterior outer angles of humeral plates (2) ...	4 3	4 7	3 5	3 6	2 11
Number of tubercles in 1 inch along middle of back of neck, about	Seven	Ten	Seven	Nine	Sixteen

REFERENCE.—*Testudo longicollis*, Shaw, Gen. Zool. v. 3, t. 6; = *Chelodina Novæ-Hollandiæ*, Dum. & Bib. Erp. v. 2, p. 443, t. 21, p. 2.

This handsome Tortoise is as common in the rivers of Southern Gippsland as the *Chelemys Macquaria* is in the Murray and its tributaries; and although it also inhabits the more northern Australian rivers, the *Chelemys* has not yet been found in those flowing south. Although the yellow upturned sides of the carapace are usually marked with square brown patches on the edges of the plates, and those below have usually broad brown edges, some rare examples have the brown so extended as almost to obliterate the usual, yellow ground colour. The detailed measurements I have given show how the individual plates, as well as the general outline of carapace and plastron, vary; in none of my specimens do the anterior edges of the 2nd and 11th marginal plates coincide with sutures of the costal plates, as mentioned in

Dr. Gray's examples. There are certainly no barbels under the chin of this tortoise.

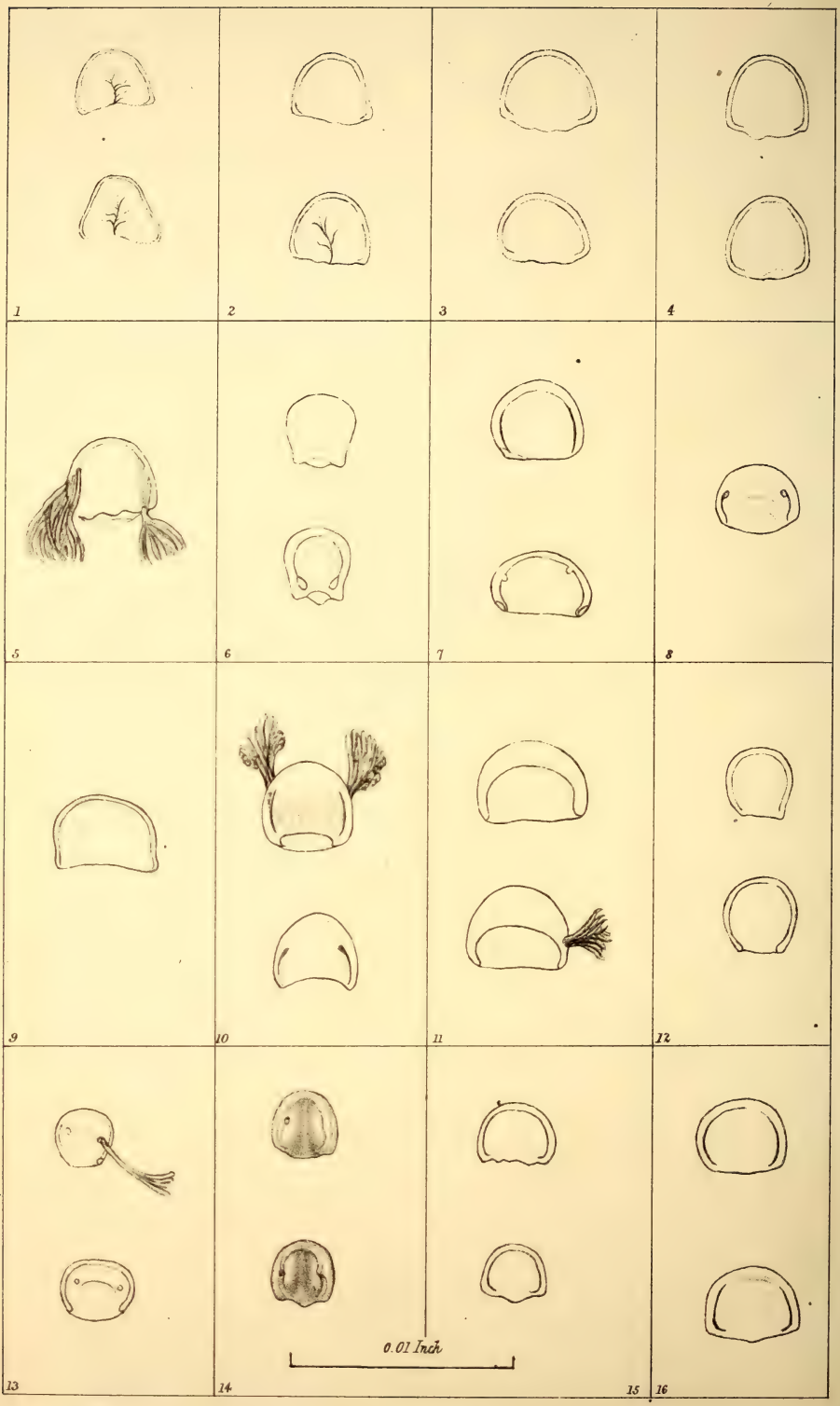
The small young agree with the large adults in all respects of dorsal sulcus, rugosity of carapace, shape and colour, the only difference being the less reflexion of the middle lateral edges of the carapace. The only specimen I have of the *C. sulcifera* is from the Goulburn, and is about the same size as the smallest above measured, but has a very much wider carapace in proportion to its length (*C. longicollis* $\frac{51}{100}$, *C. sulcifera* $\frac{64}{100}$), and it has no dorsal sulcus, has radiating ridges on the plates of the carapace, and concentric lines forming a broad margin round the sutures; the colouring is the same in both; and whether they are distinct species or varieties I am unable to satisfy myself without examining more specimens of the *C. sulcifera.*

Explanation of Figures.

Plate 92.—Fig. 1, dorsal view of carapace, to show markings and dorsal sulcus. Fig. 2, underside of another specimen in the attitude it assumes when turning from its back to the ordinary position, which it effects by pressing its beak against the ground. Fig. 3, diagram of plates of the plastron. Fig. 4, diagram of plates of carapace. These plates are numbered to agree with the description.

Plate 93.—Fig. 1, average specimen, half natural size. Fig. 2, egg, natural size.

Frederick McCoy.



P. H. McG. del. J.R. lith.

Prof. McCoy dir. exc.

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PLATE 94.

OPERCULA OF SPECIES OF RETEPORA.

FIG. 1, R. MONILIFERA.

2, R. MONILIFERA, VAR. SINUATA.

3, R. MONILIFERA, FORM MUNITA, VAR. LUNATA.

4, R. MONILIFERA, FORM MUNITA, VAR. ACUTIROSTRIS.

5, R. MONILIFERA, FORM UMBONATA.

6, R. FORMOSA.

7, R. AURANTIACA.

8, R. PORCELLANA.

9, R. PORCELLANA, VAR. LAXA.

10, R. CARINATA.

11, R. GRANULATA.

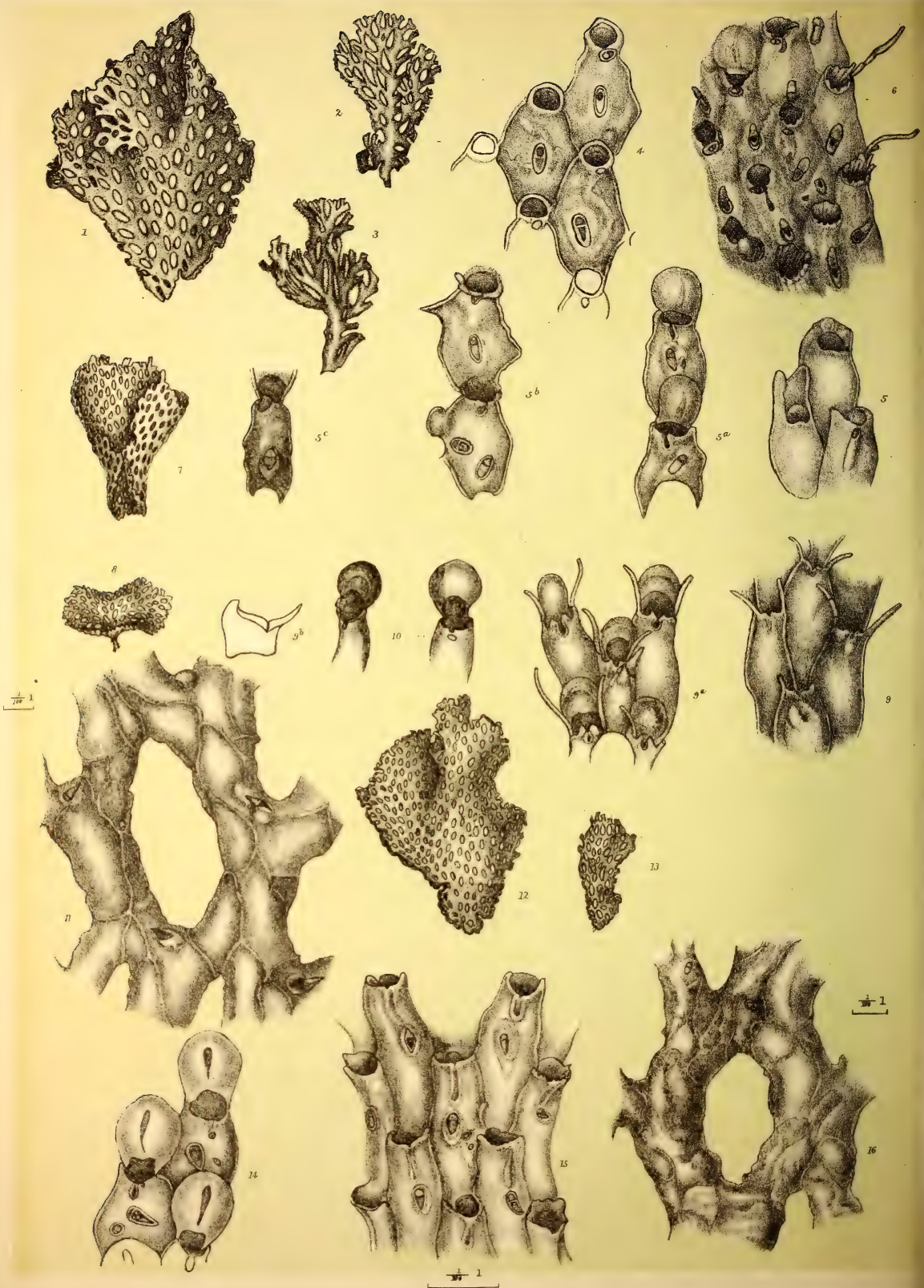
12, R. SERRATA.

13, R. PHŒNICEA.

14, R. TESSELLATA.

15, R. FISSA.

16, R. AVICULARIS.



P. H. M.cG. lt. J. R. del. J. Ripper lith.

Prof. M.c Coy direx.

Steam. litho. Gov.t Printing Office.

PLATE 95, FIGS. 1–6.

RETEPORA PORCELLANA (P. McG.).

DESCRIPTION. — Polyzoary massive, expanded, convoluted, or calyculate; fenestræ elongated; cells rhomboidal, separated by distinct raised lines, terminating superiorly opposite the lower part of the mouth; mouth arched above, straight or slightly hollowed below; lower lip entire, with (usually) an avicularium below it; a spine articulated on each side; operculum rounded, wider than high; an elliptical avicularium on the front of the cell, with a spatulate or linguiform mandible directed vertically or obliquely downwards; ovicell rounded, smooth, or with a few ridges, much immersed, when young with a broad, short, vertical opening, which, as growth advances, becomes filled in, and in some cases forms a slightly prominent ridge; dorsal surface obscurely granular or slightly areolated, traversed by numerous raised lines, and usually with one or more small oval avicularia on each part defined by those vibices.

REFERENCES.—P. H. MacGillivray, Tr. Roy. Soc. Vict., 1869 and 1882; *R. robusta*, Hincks, Ann. and Mag. Nat. Hist., May 1878.

Port Phillip Heads.

Varies a good deal in appearance, according to age, old specimens being very massive, the fenestræ shorter and interspaces thicker than in younger individuals. The form of the lower lip varies. It is usually straight and entire, with a rounded avicularium immediately below. Sometimes there is a slight fissure in place of the avicularium, and occasionally there is a fissure towards one side, and on the wider part of the lip an avicularium. In young marginal cells there is no appearance of any sinus. Frequently the central part of the cell is depressed. A variety occurs which I have named *laxa*, presenting so marked a difference in its appearance that I was inclined to consider it as a distinct species. In it the fenestræ are very long, and are formed by the irregular division and anastomosis of broad branches from a main stem. The cells are usually longer, the separating raised margins not so prominent, and many of the oral spines, of which in the marginal cells there are frequently four or five, are very long and jointed, as in *R. monilifera*, but much more slender. An old dead specimen of this

variety has a very peculiar appearance, being divided into regular longitudinal ridges, the intervening hollows formed by the mouths and depressed centres of the cells.

Explanation of Figures.

Plate 95.—Figs. 1 and 2, specimens, natural size. Fig. 3, specimen of var. *laxa*, natural size. Fig. 4, small portion of fig. 1, magnified. Fig. 5, young marginal cells from another specimen. Figs. 5*a*, 5*b*, 5*c*, other cells from same specimen. Fig. 6, cells from var. *laxa*, fig. 3, magnified.

Plate 95, Figs. 7–11.

RETEPORA AVICULARIS (P. McG.).

Description. — Polyzoary expanded, convoluted; fenestræ elongated, wider than the interspaces; cells elongated, separated by distinct margins; mouth arched above; lower lip with a central loop-shaped mark, frequently perforated below, on each side of which is a triangular projection pointing upwards; a long spine articulated on each side of the mouth; operculum rounded; numerous large avicularia, the rostrum elevated and with strong curved beak, the mandible triangular and pointed; ovicell rounded, prominent, smooth, and entire; dorsal surface smooth, vibicate, with scattered avicularia, with triangular mandibles.

Reference.—P. H. MacGillivray, Tr. Roy. Soc. Vict., 1882.

Port Phillip Heads.

This elegant species attains a size of only about an inch high. It is very light and fragile. The lower lip with its two small triangular denticles, and the loop-shaped mark extending downwards from between them, is very characteristic. This structure, with the rounded, entire, smooth ovicell, sufficiently distinguishes it from our other species.

Explanation of Figures.

Plate 95.—Figs. 7 and 8, specimens, natural size. Figs. 9 and 9*a*, portions of another specimen, magnified. Fig 9*b*, outline of avicularium. Fig. 10, a single cell and ovicell. Fig. 11, dorsal surface, half as much magnified.

PLATE 95, FIGS. 12–16.

RETEPORA FISSA (P. McG.).

DESCRIPTION.—Polyzoary expanded, waved, or slightly convoluted; fenestræ oval; cells rhomboidal or elongated, separated by raised lines; mouth rounded above, lower lip hollowed, entire, or with a slight sinus and loop-shaped mark or groove about the centre; operculum rounded, broader than high; an avicularium near the middle of the cell, with the triangular mandible directed downwards, or downwards and outwards; ovicell large, rounded, prominent, with a vertical fissure, wider above, closed below; posterior surface with numerous slightly prominent vibices and a few small avicularia.

REFERENCE.—P. H. MacGillivray, Tr. Roy. Soc. Vict., 1869, 1882, and 1883; *R. marsupiata ?*, Smith, Floridan Bryozoa.

This species, which is probably not uncommon, varies considerably. In young specimens the interspaces are slender, with from 1 to 3 or 4 rows of cells; the fenestræ being large and wide, giving to the whole a more open appearance. Older specimens are much more calcareous, the fenestræ comparatively smaller, and the polyzoary altogether more massive. In the most developed specimens the mouth has the lower lip nearly straight or hollowed, entire, or with an obscure sinus from which extends downwards a short groove. In more slender specimens the cells are longer and narrower; the upper part of the cell is curved forwards, the mouth nearly circular, and opening upwards. From the centre of the lower lip a shallow groove, with slightly raised edges, extends vertically downwards; immediately below this, or slightly to one side, is usually an avicularium, with a bluntly triangular mandible directed downwards and tilted somewhat forwards. The lower lip on either side of the groove is smooth or sometimes serrated. The edges of the groove occasionally meet to form a tube extending its whole length, or confined to the lower end. The avicularium on the front of the cell is frequently situated on an elevation which is sometimes of enormous size; the mandible is then much larger and more acutely pointed. Sometimes there are more than one avicularium on a cell.

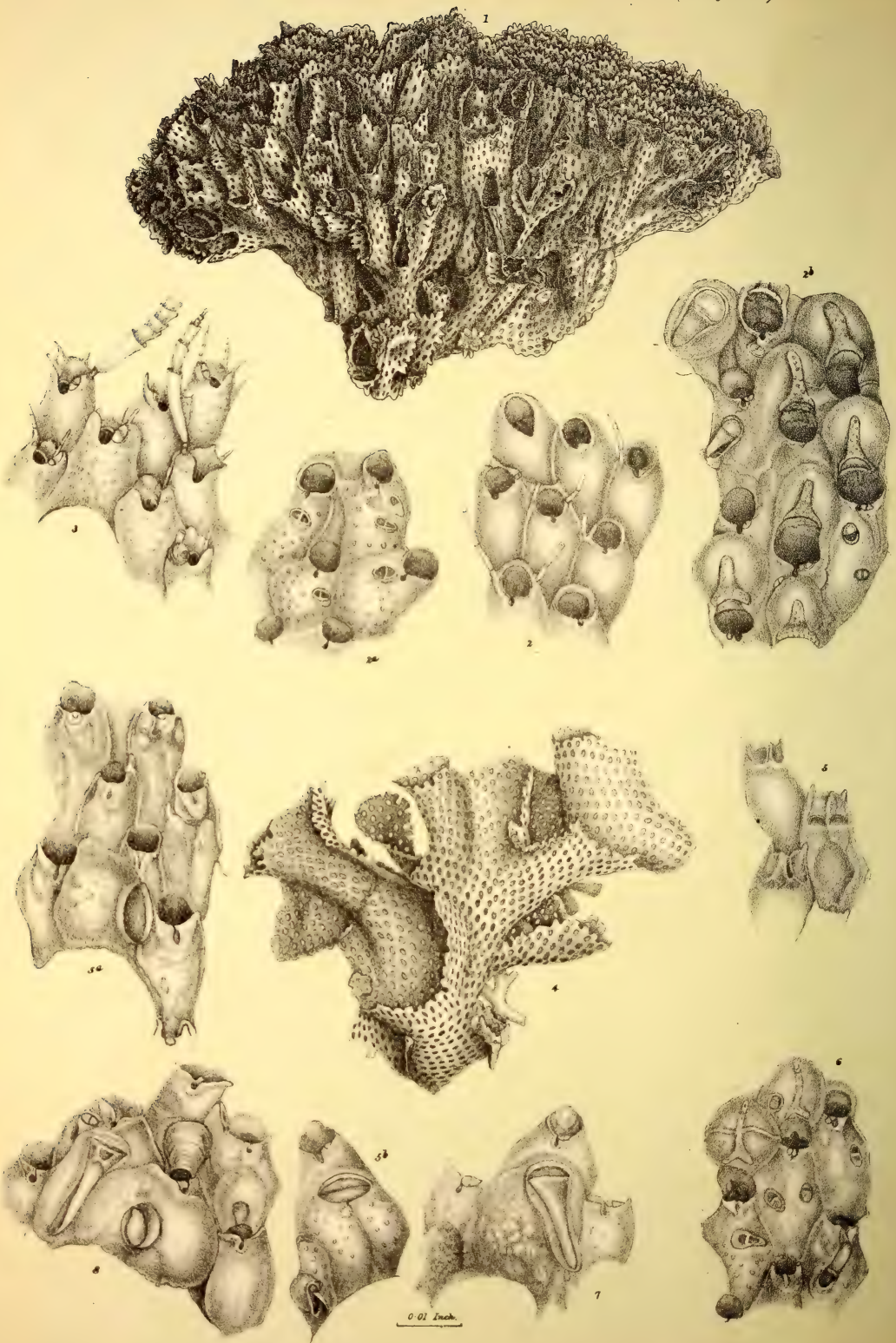
The characteristic features are the loop-shaped mark or groove from the lower lip, the avicularium on the middle of the cell, and the permanent slit on the ovicell.

It is allied to the European *R. cellulosa*, which does not occur in my collection. The specimens referred to that species by Busk, Hincks, and others, probably belong to the present. I think also that Smith's Floridan *R. marsupiata* is identical with the more slender form of our species.

Explanation of Figures.

Plate 95.—Figs. 12 and 13, specimens, natural size. Fig. 14, portion of fig. 12, magnified. Fig. 15, portion of the more slender form (= *marsupiata*, Sm. ?), magnified. Fig. 16, dorsal surface of another specimen of var. *marsupiata*, half as much magnified.

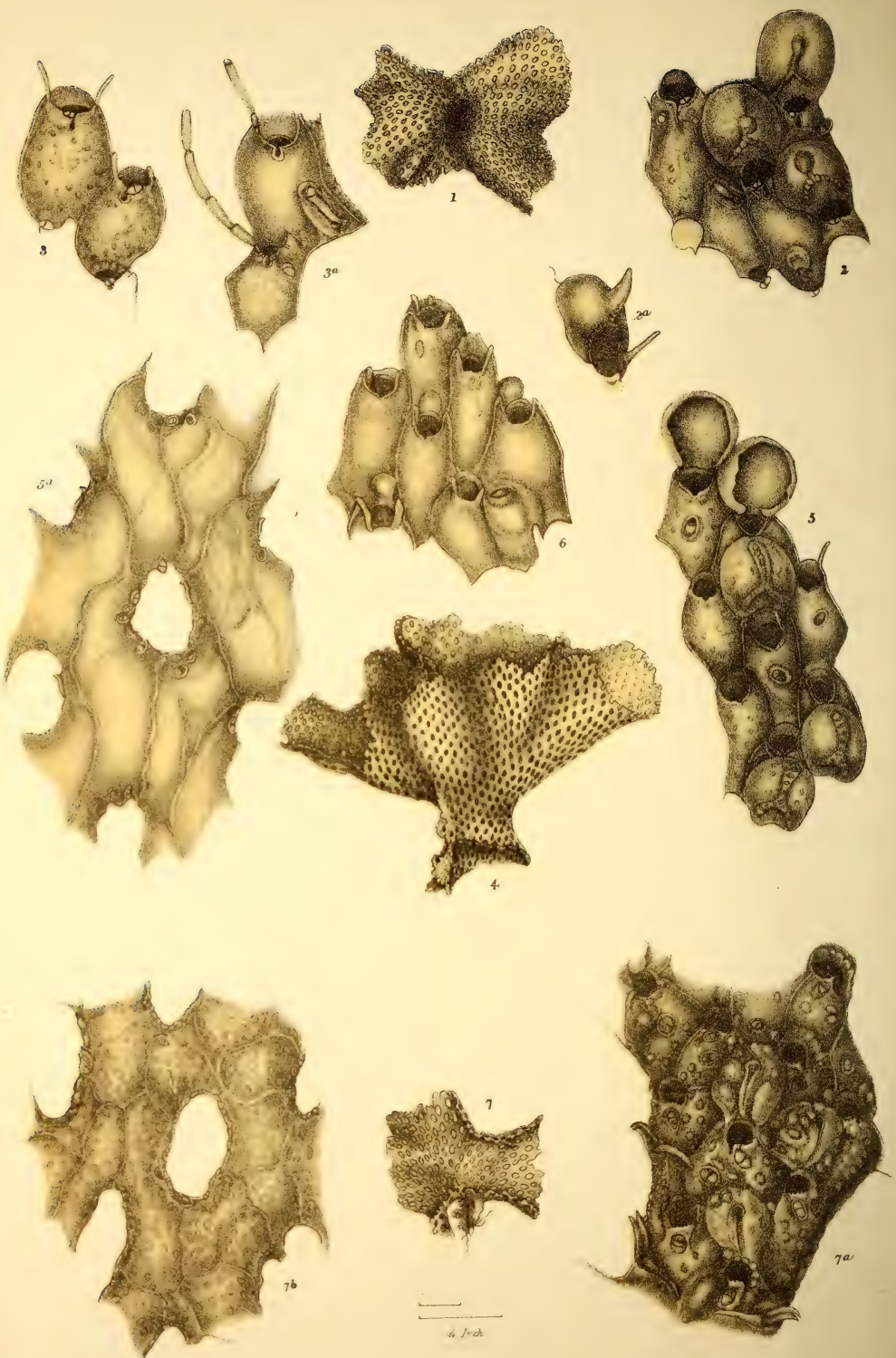
(Polyzoa)



P.H.McG & J.R.del. J.Ripper lith. Prof.McCoy direct Steam Litho. Govt. Printing Office

ZOOLOGY OF VICTORIA

(Polyzoa)



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Prof. Mc Coy direct.

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PLATES 96–7.

RETEPORA MONILIFERA (P. McGIL.).

[Genus RETEPORA (IMPERATO). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-order Cheilostomata. Fam. Escharidæ.)

Gen. Char.—Polyzoary stony, reticulated. Cells opening on one surface only, immersed, indistinct posteriorly. Posterior surfaces vibicate.]

DESCRIPTION. — Polyzoary foliaceous, variously convoluted; fenestræ oval, narrower than the interspaces; cells separated by narrow, raised lines, convex, smooth or granular; primary orifice arched above, straight below, or hollowed, or with a minute sinus; secondary orifice with a sinus in the lower lip, permanently open, or becoming closed, at one side of which is generally a small oval avicularium; operculum arched above, straight below; usually an elliptical avicularium on the front of the cell, and others of various forms on different parts of the polyzoary; ovicells prominent, rounded, or pyriform, with a beaded or granular band above the orifice from which extends upwards a similar vertical band; dorsal surface vibicate, granular.

REFERENCES.—MacGillivray, Tr. Roy. Soc. Vict. 1859 and 1883; Hincks, Ann. and Mag. Nat. Hist., May 1878.

This abundant species presents several forms so marked that it may be doubtful whether they ought not to be considered as species. In all, however, the mouth has essentially the same structure, a fissure in the lower lip of the peristome with a small avicularium at one angle of the opening. This fissure is sometimes closed by the complete or partial coalescence of the opposite sides leaving only a loop-shaped mark, or the lower end remaining perforated by a round foramen. The angle supporting the oral avicularium is frequently much produced forwards. The other avicularia are extremely various. There is generally an elliptical one on the front of the cell, and forms with semilunar mandibles are common. On the inner edge of many of the fenestræ one or more are found with long narrow mandibles closing in a rostrum which has a sharp tooth on each side towards the point. These open horizontally inwards. In all, the ovicell is prominent and marked by a beaded line immediately above the orifice from the middle of which a branch extends vertically upwards. In *sinuata* the upper part of the vertical line frequently projects considerably forwards, in

munita it occasionally ends in a sharp spine, while in *umbonata* it ends at the base of a large sharp umbo. All intermediate forms may be observed. The general form of the operculum is similar, although somewhat modified in the different forms. In the typical form it is thinner, and constantly presents a peculiar dendroid marking, which also occasionally occurs in *sinuata*, but not in the others. The peculiar large, jointed spines seem to be confined to the typical form (including var. *sinuata*) and *umbonata;* at least I have not seen them in the *munita* form.

The different varieties may be all grouped under three Forms or Sub-species :—

Form monilifera (P. McG.).

Plate 96, Fig. 1–3.

Description.—Polyzoary expanded, foliaceous, closely plicated, usually much broader than high; fenestræ rounded or elliptical, much narrower than the interspaces; mouth at first with the lower margin entire or with a slight notch; as growth advances, the peristome of the lower lip is much produced, retaining a narrow notch, at one angle of which a small avicularium is situated; ovicells prominent, the beaded line broad, the extension upwards slightly clavate, and extending nearly to the upper edge.

Port Phillip Heads ; Portland, Mr. Maplestone ; Warrnambool, Mr. Watts.

This common form is confined to shallow water. On the framework of the wooden pier at Queenscliff it forms large masses, almost dry at low tide. The mode of growth is characteristic. The polyzoary is closely plicated, forming numerous, narrow calycles and cavities, expanding widely from its attachment and, sometimes, either from a single zoarium or the confluence of several, forming masses 6–9 inches wide and 2–4 or 5 high. In the youngest marginal cells the shape of the mouth varies, the lower edge being straight, hollowed, with a small central sinus, or with a deep lateral one. As growth advances a narrow central sinus is formed in the peristome. On one angle of this a small avicularium is usually developed. Occasionally this angle is much produced forwards, bearing the avicularium on its summit. Sometimes the angles of the sinus coalesce, leaving a rounded foramen, and occasionally this

also is obliterated. There is usually an elliptical avicularium on the front of the cell, towards the upper part, either vertical or oblique, sometimes nearly central, but oftener to one side. In some specimens numerous other avicularia are found, often on calcareous elevations. The mandibles are of various forms, pointed, spatulate, or semilunar, one of the last frequently situated above a fenestra. The beaded line of the ovicell is thick, the vertical part extending to its summit, where its clavate extremity is occasionally slightly elevated. Small oval or elliptical avicularia are scattered irregularly over the back, sometimes with triangular mandibles, and occasionally one of the latter of a larger size is found at the base of a fenestra.

In young cells there are frequently two long, hollow, jointed spines attached at the upper margin of the mouth. In older cells, and occasionally in younger ones, there is an enormous spine on one side articulated to an elevation of the peristome. These spines are of peculiar structure (first pointed out by Hincks), consisting of segments narrower at the base, expanding upwards, and each segment fitting into the one below, somewhat like the joints of an Equisetum.

A marked variety, which I have named *sinuata*, is usually found surrounding the stems of black algæ, and attains a size of about 2 inches by 1 to $1\frac{1}{2}$. In this the polyzoary is much thicker and denser. The sinus in the lower lip is much wider and deeper, and the oral avicularium is larger. The jointed spines, which are commonly present, are of great size; the first joint is very long, the succeeding ones much shorter. The ovicells are broader, and the vertical beaded line is frequently elevated towards its upper extremity. The avicularia are usually very numerous, and are frequently raised on calcareous eminences. They vary much in shape, and the mandibles are often broadly spatulate. The back is densely granular, the vibices little prominent, and the avicularia very few.

Form munita (Hincks).

Plate 96, Figs. 4–8.

Description. — Polyzoary expanded, foliaceous, convoluted to form large cavernous or calyculate masses; cells separated by narrow raised lines, surface granular; peristome expanded forwards, with a loop-shaped mark in the centre of the lower lip, closed or perforated below, on one side of which is an avicularium. Small oval avicularia on the front of the cells, and various others scattered in different parts. A very large avicularium, with either a semilunar or a very long, triangular, pointed mandible, above the upper angle of each fenestra; ovicells with the beaded line narrow; posterior surface granular; vibices well marked; elliptical avicularia more abundant about the edges of the fenestræ.

The largest specimen I have measures $2\frac{1}{2}$ by 3 inches; but as all my others are incomplete, it probably attains a considerably greater size. The convolutions of the polyzoary form large cavities, and are not closely plicated as in the form *monilifera*. The peristome is usually much elevated forwards, with a loop-shaped mark, or occasionally a fissure, on one angle of which is a small avicularium. This avicularium is frequently, however, absent. It is also sometimes very much elevated on a production of the peristome. There is occasionally a thin spine at each side of the mouth above, but I have never seen the large jointed spines found in the other forms.

Two varieties are distinguishable. In the one, *lunata*, the supra-fenestral avicularium has the mandible semilunar and very large, and the loop of the peristome is usually imperforate. In the other, *acutirostris*, which is also usually altogether stouter, the same avicularium has an enormous, pointed mandible; and the peristome is occasionally perforated. Occasionally both forms of large avicularia occur on the same specimen.

Form umbonata (P. McG.).

Plate 97, Figs. 1–3.

Description.—Polyzoary foliaceous, expanded, or convoluted; fenestræ elliptical, narrower than the interspaces; cells quadrate or ovate, separated by much raised margins; surface granular, glassy; mouth sloping obliquely backwards; in young cells lower lip nearly straight or hollowed, entire, thin; in older with a loop-shaped notch, at one angle of which is an avicularium; this notch frequently bridged over, leaving a small foramen, also sometimes obliterated, in the latter case the lip being thickened, and at its junction with the lateral margins projecting slightly, giving origin to slender, jointed spines; in many of the older cells these spines are very thick and telescopic in appearance, and frequently confined to one side; avicularia very varied, frequently a semilunar one above a fenestra, and also often one with a long, narrow mandible closing in a bidentate rostrum, opening horizontally inwards on the edge of a fenestra; ovicell prominent, the vertical band ending in the base of a sharp, smooth, umbonate process; posterior surface strongly vibicate, with numerous, small, round avicularia, especially about the edges of the fenestræ.

Port Phillip Heads, 15 fathoms.

This form, which is of comparatively small size, is distinguished by the much-raised margins of the cells and the peculiar umbonate process on the ovicell. These characters are usually so marked that it might seem necessary to constitute a distinct species. In some cases, however, the umbonate process scarcely exists, and the vertical band is little more raised than in *sinuata*. Young cells of *munita* also frequently have the margins much raised.

Explanation of Figures.

Plate 96.—Fig. 1, specimen *R. monilifera*, normal form, natural size. Fig. 2, young marginal cells, from a similar specimen, magnified. Fig. 2*a*, other cells from the same specimen. Fig. 2*b*, older portion, showing ovicells and avicularia. Fig. 3, portion of var. *sinuata*, showing large sinus, oral avicularia, and spines. Fig. 4, specimen of *R. monilifera*, form *munita*, natural size. Fig. 5, young cells of var. *lunata*. Fig. 5*a*, another portion of the same specimen, showing a large avicularium. Fig. 5*b*, single cell and avicularium of same specimen. Fig. 6, small portion of another specimen, showing ovicells. Fig. 7, small portion of var. *acutirostris*, to show large avicularium and structure of the mouth. Fig. 8, small portion of another specimen, showing both semicircular and long-pointed avicularia.

Plate 97.—Fig. 1, specimen of *R. monilifera*, form *umbonata*, natural size. Fig. 2, small portion, magnified. Fig. 2*a*, ovicell, partly in profile, to show prominence of umbo. Fig. 3, young cells. Fig. 3*a*, two cells of same specimen, showing the long, jointed spines.

PLATE 97, FIGS. 4–6.

RETEPORA FORMOSA (P. McG.).

DESCRIPTION.—Polyzoary expanded, foliaceous, convoluted so as to form large funnel-shaped compartments; fenestræ rounded or oval, narrower than the interspaces; cells elongated, expanded above, separated by distinct raised lines; surface minutely granular; mouth sloping backwards, narrowed below, the thickened lateral margin uniting at an acute angle with the raised cell-margin; the lower lip straight, with a minute sinus; operculum higher than broad, slightly contracted below; usually an elliptical avicularium on the front of the cell; ovicell large, prominent, with a small beaded band on each side above the aperture meeting at an angle in the middle, and extending vertically upwards to end in a slightly clavate extremity; dorsal surface strongly vibicate, granular, and with numerous elliptical or rounded avicularia close to the edges of the fenestræ.

REFERENCE.—P. H. MacGillivray, Tr. Roy. Soc. Vict., 1883.

Port Phillip Heads, 10–18 fathoms.

This beautiful species in appearance and size precisely resembles the *munita* form of *R. monilifera*. It is, however, at once distinguished by the form of the mouth, which slopes backwards and is wide above and contracted below. The lower lip is straight, and has usually a minute rounded sinus, and is destitute of oral avicularium. The slightly thickened sides of the mouth unite at an acute angle with the elevated margins of the cells. The operculum is also of a very characteristic shape, in correspondence with the form of the mouth. Besides the avicularium on the front of the cells and those on the back of the polyzoary, there is frequently one with a long pointed mandible opening horizontally inwards on the edge of the fenestræ. An avicularium with a semilunar mandible is also occasionally found above a fenestra in front.

EXPLANATION OF FIGURES.

PLATE 97.—Fig. 4, specimen, natural size. Fig. 5, portion of a specimen, showing the ovicells. Fig. 5*a*, dorsal surface, half as much magnified. Fig. 6, small portion of another specimen.

PLATE 97, FIG. 7.

RETEPORA CARINATA (P. McG.).

DESCRIPTION.—Polyzoary expanded; fenestræ elongated, narrower than the interspaces; cells ovate, broad, separated by narrow raised margins; mouth (primary) with the lower lip entire, or (secondary) with a deep sinus at one side and a large avicularium towards the base of the prominent peristome; operculum rounded above, hollowed below, broader than high; on the inner margin of the fenestræ several avicularia with long, pointed mandibles directed vertically from before backwards; ovicell subimmersed, pyriform, with a vertical, sharp ridge slightly bulbous at its upper extremity; dorsal surface granular, traversed by slightly raised vibices, and with a few rounded avicularia about the edges of the fenestræ.

REFERENCE.—P. H. MacGillivray, Tr. Roy. Soc. Vict., 1883.

The only specimen I have seen of this very distinct species was dredged at Port Phillip Heads. It is perfect, and forms a waved, somewhat fan-shaped expansion, $\frac{7}{8}$ths of an inch wide by about $\frac{3}{4}$ths deep. The cells are mostly broad, prominent, tubercular, and glistening. The mouth is broad, arched above, and in the youngest seems to be entire and straight below or slightly convex. The peristome is rapidly developed on the lower lip, projecting as a plate with a deep notch at the angle of the mouth on one side, and receding gradually from this to nearly the level of the opposite angle, but without any notch on that side. The margin is frequently finely serrated. There is a considerable prominent avicularium below the lower lip, with the broad mandible directed upwards, usually inclined to the angle formed by the sinus. There are also other round or elliptical avicularia scattered in various parts, and numerous avicularia with long narrow mandibles, closing in bidentate rostra, close to the edges of the fenestræ. Similar avicularia occur in some other species; but in these, so far as I have seen, they always open horizontally inwards, while in the present they are directed across the edge of the fenestræ. The vertical slit, the closure of which gives rise to the vertical ridge on the ovicell, is still in some instances slightly open towards the upper extremity.

EXPLANATION OF FIGURES.

PLATE 97.—Fig. 7, specimen, natural size. Fig. 7*a*, portion magnified. Fig. 7*b*, portion of dorsal surface, half as much enlarged.

(Polyzoa)

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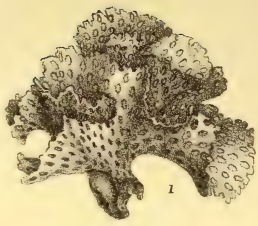

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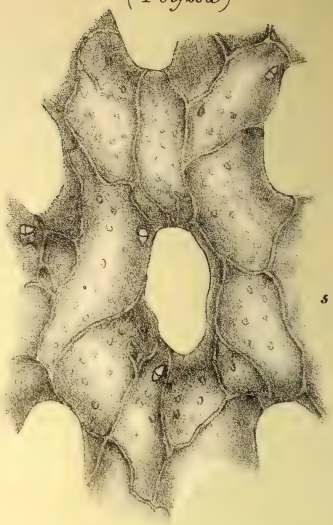

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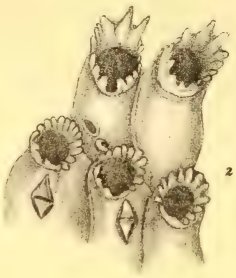

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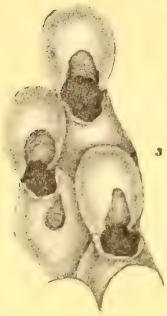

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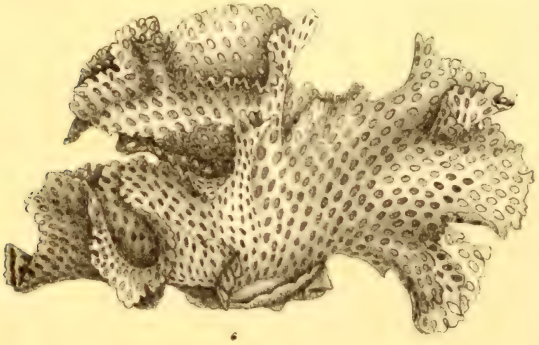

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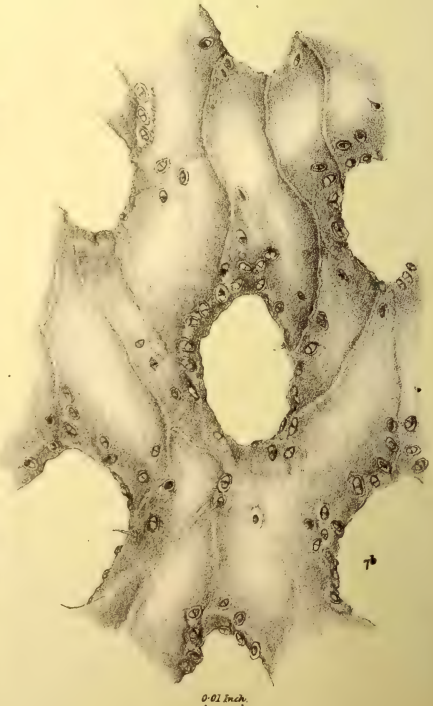

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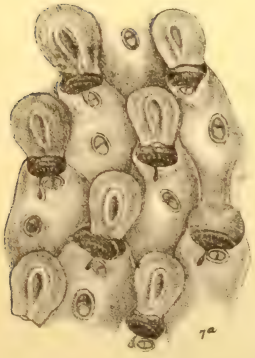

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P. H. Mc G. & J. E. del. J. Kipper lith.

Prof. Mc Coy direct

Steam litho. Govt. Printing Office

PLATE 98, FIGS. 1–5.

RETEPORA PHŒNICEA (BUSK).

DESCRIPTION.—Polyzoary expanded, foliaceous, convoluted; fenestræ small, rounded, or elliptical, narrower than the interspaces; cells enlarged upwards, separated by narrow, raised lines; surface smooth or perforated by a few large foramina; mouth rounded, projecting forwards, in youngest cells with a fringe of short spinous processes or serratures and a sinus below, in older with an entire or slightly serrated margin, and usually a minute rounded sinus on the lower lip; operculum broad, rounded, with the muscular impressions small, round, and at a distance from the margin; a broad avicularium with sharply triangular mandible below the mouth; ovicell rounded, sub-immersed, the lower part with a broad mesial plate curving downwards and backwards; posterior surface nearly smooth or sub-granular, with numerous prominent vibices and a few minute avicularia.

REFERENCES.—Busk, Brit. Mus. Cat., Mar. Polyzoa; Hincks, Ann. and Mag. Nat. Hist., May 1878.

Port Phillip Heads; Portland, Mr. Maplestone; King's Island, Mr. McGowan.

This species forms small, convoluted masses of a beautiful vivid red colour. The finest specimen I have seen is that figured. The cells, which are separated by narrow raised lines, are smooth or sub-granular, and have usually several rounded foramina towards the margins. These are commonly arranged in two pairs, one on the upper part near the mouth, the other towards the base. In a young specimen, $\frac{1}{8}$th of an inch in diameter, for which I am indebted to Mr. Wilson, the cells have the mouth nearly circular with a thick fringe of short processes, longest above, but not developed into distinct spines, connected by an intermediate calcareous expansion. In old cells the peristome is smooth and little prominent, or projects more and is obscurely serrated; there is also usually, but not always, a small rounded sinus in the lower lip. In most cells there is a large avicularium below the mouth, with a broad, sharply triangular mandible directed upwards. The ovicells are very conspicuous. They are white, sub-immersed, and at the lower part have a broad mesial plate which curves downwards and backwards, leaving a rounded notch on each side. Their

surface is frequently marked by narrow raised lines which in many cases seem to mark the lateral boundaries of the incurved plate. The dorsal surface is sub-granular, with numerous, sharply-raised vibices. The avicularia are very sparse, small, and with triangular mandibles. They are mostly situated close to the margins of the fenestræ. The operculum differs from that of all the other Victorian Retepores in having the occlusor muscles attached to small round impressions at a distance from the margins.

Explanation of Figures.

Plate 98.—Fig. 1, specimen, natural size. Fig. 2, group of young marginal cells, from another, very small, growing specimen, magnified. Fig. 3, small group, showing partially developed ovicells. Fig. 4, group with fully formed ovicells. Fig. 5, portion of the back of the polyzoary, magnified half the dimensions of the other enlarged views.

Plate 98, Figs. 6–7.

RETEPORA AURANTIACA (P. McG.).

Description.—Polyzoary expanded, foliaceous, convoluted; fenestræ elliptical or oval, about the same width as the interspaces; cells quadrate, separated by narrow raised margins; mouth rounded above, straight below, with a deep narrow sinus, on one side of which is a rounded avicularium; a long, jointed spine articulated on each side of the mouth; operculum large, much wider than high, hollowed at the sides inferiorly; usually a round avicularium on the front of the cell; ovicell large, pyriform, with a vertical, narrow fissure, wider above, and with thickened margins; dorsal surface strongly vibicate, granular, and with numerous small, rounded avicularia, especially abundant near the fenestræ.

Reference.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1882.

Port Phillip Heads.

The largest complete specimen I have seen is three inches wide by about two in the other diameters. The base of attachment is about an inch long. The avicularium on the front of the cell is by no means constant. The ovicells are abundant, and have a very distinctive appearance; with growth the vertical slit is sometimes filled in, leaving a slightly prominent ridge. It is an exceedingly handsome species of a beautiful orange colour.

Explanation of Figures.

Plate 98.—Fig. 6, specimen, natural size. Fig. 7, cells near the margin, magnified. Fig. 7*a*, another portion of the same, showing the ovicells. Fig. 7*b*, portion of the dorsal surface, magnified to half the dimensions of the others.

1/6 Inch.

P. H. Mc G. del. J. R. del. J. Rapper lith.

Prof. Mc Coy direx.

Steam Litho. Govt. Printing Office

PLATE 99, FIGS. 1–3.

RETEPORA GRANULATA (P. McG.).

DESCRIPTION.—Polyzoary massive, convoluted; fenestræ rounded, small, much narrower than the interspaces; cells elongated, separated by narrow, raised lines; mouth arched above, straight below, lower lip with a narrow vertical sinus, on one side of which is a rounded avicularium; operculum much wider than high; surface of cells granular or tuberculate; numerous small oval avicularia scattered over the cells, and a few larger situated on rounded elevations; ovicell large, rounded, granular; dorsal surface granular, vibicate, with small, scattered, rounded avicularia.

REFERENCES.—P. H. MacGillivray, Tr. Roy. Soc. Vict., 1869 and 1882; Hincks, Ann. and Mag. Nat. Hist., May 1878.

Port Phillip Heads.

This is the most massive of our Australian species, and attains a large size, the specimen figured measuring four inches high by the same width. It is of a brownish colour. In addition to the usual granulations over the surface, in many cases there is a row forming small processes on the upper margin of the mouth. The young ovicell is fissured, the fissure becoming filled in as calcification advances. In some specimens there are numerous rounded avicularia scattered over the cells and ovicells, occasionally raised on small elevations. There are also other large avicularia with triangular mandibles on large mound-like elevations.

EXPLANATION OF FIGURES.

PLATE 99.—Fig. 1, specimen, natural size. Fig. 2, portion of another specimen, magnified. Fig. 3, portion to show the dorsal surface, magnified half as much.

PLATE 99, FIGS. 4–8.

RETEPORA TESSELLATA (HINCKS).

DESCRIPTION.—Polyzoary small, foliaceous, convoluted; fenestræ elongated, usually narrower than the interspaces; cells oval or rhomboidal, separated by narrow, raised lines; mouth higher than broad, with a projecting angle on each side, where the raised cell-margin originates, caused by abrupt sloping backwards; lower lip deeply concave, entire, or with a minute rounded sinus; operculum with a broad groove down the centre; an avicularium on the front of the cell, with a long narrow mandible; ovicell rounded, sub-immersed, excavated below; dorsal surface smooth

or minutely tubercular, divided by numerous raised lines into irregular spaces, in each of which is usually situated a long narrow avicularium similar to those on the front of the cells.

REFERENCE.—Hincks, Ann. and Mag. Nat. Hist., May 1878.

Port Phillip Heads, 12–15 fathoms.

The best specimens I have of this species are of small size, one measuring 1 by $\frac{3}{4}$ inch, and another $\frac{7}{8}$ by $\frac{3}{8}$. The fenestræ are large, much elongated, usually rather narrower than the interspaces. The cells are oval or irregularly rhomboidal ; they are separated by narrow raised lines which unite with the slightly thickened lateral margins of the mouth at about the middle, forming a conspicuous angle on each side. The mouth is higher than wide, the lower lip hollowed, slightly thickened, entire, or with a small rounded sinus. Immediately above the junction of the separating lines of the cells the mouth recedes, and the angle here formed frequently gives rise to a jointed spine. In young, growing cells the mouth is nearly round, with a fringe-like upper edge to which are articulated several long, slender spines. A similar border and spines are also frequently present in the marginal cells of older parts. On the front of the cell is an avicularium, frequently situated on an eminence, with a long pointed mandible directed transversely, obliquely, or vertically downwards. The ovicell is rounded, deeply notched below. This notch, however, is probably ultimately filled in. The back of the polyzoary is mapped out into irregular areas by narrow raised vibices, in each of which is one or occasionally two avicularia similar to those found on the front of the cells. The operculum is very peculiar. It is of small size, rounded above ; there is an inner mark, parallel to the free margin except that at about the middle on each side it is sharply inflected inwards ; down the centre is a wide groove, on each side of which, especially towards the base, the surface bulges forwards.

EXPLANATION OF FIGURES.

PLATE 99.—Figs. 4 and 5, specimens, natural size. Fig. 6, group of cells, magnified. Fig. 6*a*, dorsal surface, showing the small areas, with narrow avicularia. Fig. 7, young cells, magnified. Fig. 8, small group, showing an ovicell.

PLATE 99, FIG. 9.

RETEPORA SERRATA (P. McG.).

DESCRIPTION.—Polyzoary expanded; fenestræ about the same width as the interspaces, or slightly wider; cells much elongated, separated by raised lines; mouth nearly circular or oval, projecting forwards, with a small sinus below, and a fringe of about 12 short, pointed processes arranged round the margin; operculum higher than wide, contracted at the base; ovicell rounded, smooth; a sessile avicularium, with a long, narrow, pointed mandible at the bottom of each fenestra, opening directly upwards; dorsal surface obscurely tubercular, strongly vibicate.

REFERENCE.—P. H. MacGillivray, Tr. Roy. Soc. Vict., 1882.

Port Phillip Heads, a single specimen.

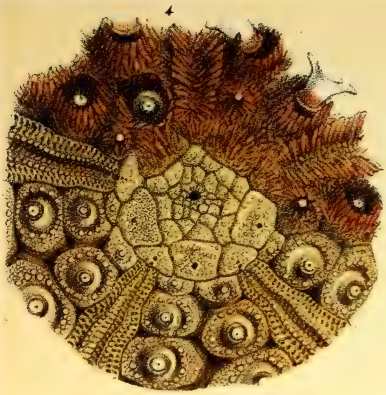
The only specimen I have seen is the very perfect one figured. It forms a small expansion $\frac{3}{4}$ths of an inch in diameter, curved on itself on one side where it is attached to the calcareous tube of an annelid. The colour is leaden-grey. The cells are elongated, narrow, slightly expanded upwards, separated by narrow raised lines. In the youngest the mouth is smooth, the lower lip straight, slightly hollowed or with a slight sinus. The peristome is rapidly developed to form a serrated circle of small sharp teeth, projecting forwards; at the lower part of this circle is a small sinus. At the bottom of each fenestra is a sessile avicularium, the rostrum with a tooth on each side behind the strong curved apex, the mandible long, narrow, curved, and pointed. There are a few other large avicularia, situated on mound-like elevations on the cells, and with spatulate or linguiform mandibles. The back is obscurely tubercular, glistening, divided into numerous angular spaces by narrow, sharply-raised vibices; a few scattered, rounded avicularia are situated about the edges of the fenestræ.

EXPLANATION OF FIGURES.

PLATE 99.—Fig. 9, specimen, natural size. Fig. 9*a*, portion, magnified.

I am indebted to my friend Mr. MacGillivray for this valuable series of *Reteporæ*, which he has contributed to the National Museum collections and this work.

FREDERICK McCOY.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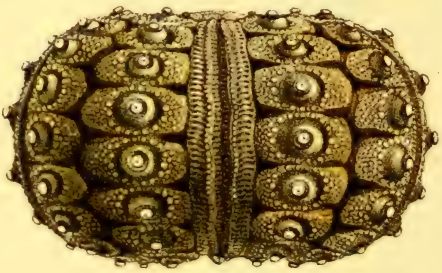

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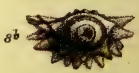
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PLATE 100.

GONIOCIDARIS TUBARIA (LAM. SP.).

[Genus GONIOCIDARIS (DESORS.). (Sub-kingdom Radiata. Class Echinodermata. Order Echinoidea. Sub-order Desmosticha. Family Cidaridæ. Sub-family Goniocidarinæ.)

Gen. Char.—Test high, often higher than broad; coronal plates numerous; primary tubercles perforated, with smooth base. Ambulacra narrower than in other genera of the family; two porous bands nearly as broad as the intervening median ambulacral space; middle of the ambulacral and inter-ambulacral spaces bare, sutural edges of the ambulacral and inter-ambulacral plates sunk, forming zigzag depressed lines and pits at the angles of the plates, in which large spherical-headed pedicellariæ are lodged, one often to each pit. Spines cylindrical, often cupped at the tip, the sides tubercular or spinose, the thorny spinules often enlarged in whorls near tip of primary spines.]

DESCRIPTION.—Test moderately depressed. Primary tubercles eleven * in each vertical row; serobicular space transversely oval; mammary boss small, not prominent; a row (or, in some parts, two rows) of secondary tubercles round the serobicular area, 4 to 6 rows of small miliary tubercles concentric with the row of secondary serobicular tubercles on inner end of each inter-ambulacral plate, but a wide smooth margin to each plate forms smooth sunk zigzag line down middle of inter-ambulacrum; a narrow band of 3 or 4 rows of miliaries, between primary tubercle and band of ambulacral pores. Primary spines thick with blunt swollen tips, more or less flattened, those of vertex funnel-shaped at tip; the tip often with a radiating row of thorny spines; others cylindrical or flattened, and variously terminated by a fringe of longitudinal lamillæ; the underside generally smoother and flatter than the upper; all with conical, thorny spines on upper side, while their lower side has irregular, longitudinal rows of blunt tubercles, or is quite smooth towards the mouth; small primary spines nearest the mouth flat and smooth above and below, both sides serrated with a row of spines, tip bluntly truncated; secondary spines and papillæ flat, smooth, with wide, flat truncated tip; all the spines show irregular, longitudinal, obtusely granular lines under the lens. Plates of vertex, or abactinal system, with broad, smooth, sutural margins, but covered with miliary granules in centre; genital plates with very small ovarian opening near middle of central patch of miliary granules; ocular pores very small, double; ambulacra with broad bands of pores and a sunken, middle portion bare along centre, with two or three irregular rows of miliary granules at sides, within the two rows of secondary tubercles which border the two bands of pores. *Colour:* Plates brownish; primary spines yellowish or white-pinkish cream colour, with the tubercles and thorny spines red, chiefly on underside towards tips; secondary spines and papillæ rich cinabar red, yellowish at tip; pedicillaria pale dull red. *Measurements:* Diameter of test of an average specimen, 2 inches 6 lines; in proportion to diameter, taken as 100, depth of test $\frac{57}{100}$, diameter of oral aperture, or actinostom $\frac{25}{100}$, diameter of abactinal system or group of plates on vertex $\frac{34}{100}$, length of cupuliform spines round vertex $\frac{35}{100}$, width of ditto at tip $\frac{22}{100}$, length of longest spines at middle $\frac{55}{100}$ to $\frac{65}{100}$, width of ditto $\frac{27}{100}$, width of ambulacra at middle $\frac{15}{100}$, middle portion of ditto between the bands of pores $\frac{7}{100}$, width of inter-ambulacra at middle $\frac{44}{100}$, width of serobicular area at middle $\frac{14}{100}$, diameter of perforated primary tubercle at middle $\frac{5}{100}$.

REFERENCE.—*Cidarites tubaria* (Lamk.) Anim. sans Vert.

* Alex. Agassiz states the number to be eight (Rev. Ech. p. 397).

The beautiful specimens of this fine sea-urchin figured on our plate were presented by Mr. Bracebridge Wilson, who dredged them near Port Phillip Heads.

The diversity of the primary spines in different parts irregularly in a given specimen or in different specimens is wonderfully great. The general character of moderate depression, with long thorny spines on the edges, shorter conical thorns on the upper side, and blunt oval tubercles on the underside, is found in most of them; the whorl of thorns round the tip, either radiating obliquely upwards and outwards round a cup-shaped tip, or inclining so little outwards as sometimes to form only a lamellar fringe round the tip. The irregularity in size and shape not being connected definitely with position. The longitudinal rows of tubercles and thorns on each spine are irregular in number and in disposition. The five longitudinal irregular lines of blunt granules seen with a lens are not only on the surface between the tubercles and thorns, but encroach upon them a variable distance. The chief variations of these primary spines I have figured on the plate from our specimens. The secondary spines are only finely marked with granular longitudinal striæ, without thorns or tubercles; and are nearly uniform, flattened, and truncated at the tip.

The pedicillariæ are in greater abundance than in any other species I have seen. They are, as usual, of two sorts, one short-stemmed, and globular, the other much longer in the stem, and having the three-valved head of an elongate inversely club-shaped figure. They appear in all the depressions at the angles of the plates, both of the ambulacral and inter-ambulacral series.

This species is easily distinguished from the *Goniocidaris geranioides*, which also occurs in our seas, by the greater depression of the test, more thorny and larger primary spines, and by the comparatively very small size of the ovarian openings, which are a considerable distance within the margins, in the midst of a patch of miliary granules, while in *G. geranioides* they are very large and touching the margin. The idea occurs to me that *G. geranioides* may be the female and *G. tubaria* the male of one species, from the many points of resemblance, and the more striking difference

of height and the very large ovarian openings being characters probably connected with development of the ovaries. The dissection of numerous individuals would be interesting as settling this point. The number of primary tubercles does not present the special difference thought by M. Agassiz, as these are certainly the same in both supposed species in all my specimens. The ocular pores seem double.

Not uncommon in Port Phillip and Western Port Bays on sandy bottoms, at about 40 fathoms.

Explanation of Figures.

Plate 100.—Fig. 1, full-sized specimen, natural size. Fig. 2, test, denuded of spines, to show the proportion of the ambulacra and inter-ambulacra, with the perforated primary tubercles, imperforate secondary and miliary tubercles, bare margins and pits at angle of the plates, natural size. Fig. 3, oral region, partly denuded of spines, showing the teeth and small curved spines bent over the mouth, natural size. Fig. 4, apical region, partly denuded of spines, showing the very small ovarian openings far in from the edge in the patch of miliary granules, the margins of the plates bare; and the apparently double oculars, natural size. Fig. 5, portion of apical region with cup-tipped spines, natural size. Fig. 6, portion of ambulacrum, showing the proportion of the two porous areæ to the middle area and the pairs of pores, row of secondary tubercles and miliary granules on the ambulacral plates, with the bare margins, depressions at angles, miliary granules, and row of secondary tubercles of the inter-ambulacral plates bordering the ambulacra, twice the natural size. Fig. 7, inter-ambulacral plates, showing the scrobicular area with the perforated primary tubercle in centre, the circle of imperforate secondary tubercles round the scrobicular area, and the rows of miliary granules not extending to the margins, which are left smooth, twice the natural size. Fig. 8, upper view of large primary spine, showing the plated modification of summit, natural size. Fig. 8*a*, side view of same, showing the sharp spines on the upper surface replaced by blunt tubercles on the lower surface. Fig. 8*b*, end view from below of same, to show the convexity of the thorny upper surface and the comparative flatness of the tuberculated under surface. Fig. 9, upper surface of one of the large primary spines, showing the obliquely radiated circle of long thorns round the funnel-shaped terminal cup. Fig. 10, smaller spine from oral region, natural size. Fig. 10*a*, top view of ditto. Fig. 11, truncated cup-shaped spine from apical region, natural size. Fig. 11*a*, side view of same. Fig. 12, upper side of small, curved spines round the mouth, magnified two diameters. Fig. 12*a*, side view of same, showing curvature towards smooth oral surface. Fig. 12*b*, section of same. Fig. 13, upper surface of secondary spine, showing its truncated tip and nearly parallel sides, three times natural size. Fig. 13*a*, same, viewed sideways. Fig. 13*b*, section. Fig. 14, the elongate form of pedicillaria from the edge of the ambulacra, magnified twenty diameters. Fig. 15, short globose sort of pedicillaria, magnified twenty diameters.

Frederick McCoy.

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Natural History of Victoria.

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